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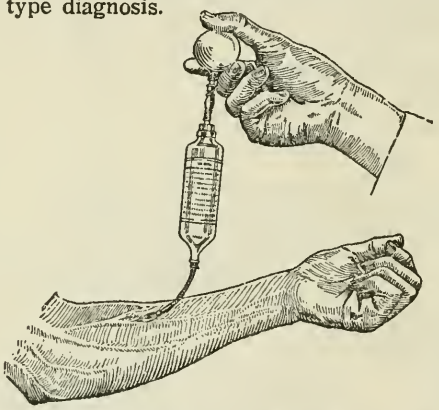

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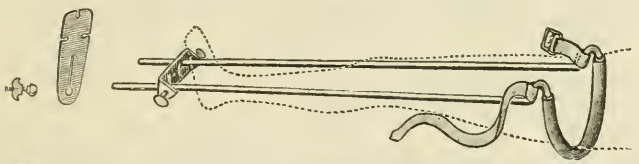

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THE
MILITARY SURGEON

VOL. XLIV OCTOBER, 1919 NUMBER 4

ORIGINAL ARTICLES

Authors alone are responsible for the opinions expressed in their contributions

A SANITARY SURVEY OF CAMP JACKSON, S. C.[1]

BY MAJOR EDWARD J. SCANNELL
Medical Corps, United States Army

(With five illustrations

The following article deals with a phase of work which falls of necessity at times on the shoulders of the medical man as well as on the sanitary engineer. Prevention is far more rational than cure and its importance in regard to personal health grows rather by geometric than arithmetic proportion as the number of men in a given locality increases. Sanitation for the casual camper or the small party is a simple proposition, but the proper care of any considerable number assembled in any one locality is influenced not only by the condition of the terrain in which they live but also by the measures which are instituted for adapting the human element to the surroundings.

While the general principles of sanitation are well known to all of us and each of us is probably capable of working out his own system of procedure, it is a distinct advantage and help to know any system or method which has already been satisfactorily made use of.

The following article dealing with this question in detail should serve in the nature of a monographic text-book for those who are now, or may be in the future, called upon to solve similar problems.—THE EDITOR.

CAMP JACKSON, S. C., is situated some 5 miles east of Columbia, the state capital, in longitude 81° West and latitude 34° North. The camp proper covers an area of approximately 3 square miles in the valley of the Congaree River. It lies on the edge of the coastal plain at an altitude of some 150 feet above sea level.

The nature of the country is rolling and swamps were prevalent not only within the camp limits but in the territory immediately surrounding it. The *timber* of the region is for the most part the long-leafed pine. The *soil* consists of a layer of sand of varying depth superimposed upon a sub-stratum of red clay. The *climate* is equable with no marked sea-

[1] The writer's purpose in making this survey is to cover, in a general way, the various sanitary measures employed in safe-guarding the health of the command during the period from May 1, 1918, to May 1, 1919, in hope that our experience may offer some suggestions of value to those interested in matters pertaining to public health.

sonal changes. The average mean temperature for 1918 was 64° F. The maximum temperature 101° F. and the minimum 6° F. were registered by the U. S. Weather Bureau. The summers as a rule are hot and humid, while the winter season is mild and open; rainfall as shown by the weather bureau averages 47.64 inches for the year.

Population.—The average population for the period was 30,000, consisting of whites and blacks. Strength of the command fluctuated greatly from month to month, especially at the height of the emergency when troop movements were numerous and rapid.

Population curve shown in graph in appendix.

WATER SUPPLY

The camp supply is derived from the city of Columbia and delivered through one 16-inch cast-iron pipe, with a capacity of 3,000,000 gallons per day.

The *source* of water is the Congaree River from a point directly opposite the city and just below the confluence of Broad and Saluda Rivers to form the Congaree.

The watersheds of the above-mentioned rivers are not thickly populated and have no large settlements nearer than 75 miles above the city of Columbia.

All water is treated by sedimentation, coagulation, filtration and chlorination.

The water is first pumped from the river into a sedimentation reservoir of 60,000,000 gallons capacity, where it is supposed to remain a sufficient length of time to allow much of the suspended material to settle out before passing on to the coagulation basins. Unfortunately the bottom and sides of the reservoir are of earth, which fact, added to the natural deposition of material, encourages the formation of channels in course of time, thus short-circuiting water from intake and carrying it almost immediately to outlet, allowing little or no sedimentation.

From the sedimentation reservoir the water passes through the mixing chamber where alum is added (from ½ to 1 gr. to the gallon) to coagulating basins of concrete construction. Here the water is detained a short time (estimated thirty to forty minutes), evidently not long enough, however, since coagulated material in large amounts can be seen passing over weir on to the filter beds.

The filtration plant consists of mechanical filters each with a capacity of something over 1,000,000 gallons per day.

Bacterial determinations of effluent from filters are made daily, covering both quality and quantity of bacteria.

For the period under discussion the filters have proved on the whole satisfactory; total count for bacteria on agar, averaging not over ten per cubic centimeter for months at a time. As for B. coli, evidence of same is almost never found even in 10 c.c. samples.

Chlorination.—In addition, liquid chlorine is added to effluent from filters in proportion of 0.4 parts per million.

Finally water reaches the clear water basin (concrete construction of 2.8 million gallons capacity), where aeration, sunlight and dilution help in providing a good potable water.

No water-borne diseases have been present in camp during the period under consideration.

The results of examination of two specimens of water, one the raw river water, the other tap water, after filtration and treatment, are shown as evidence of the apparent efficiency of filtration plant.

WATER

Raw River Sample, April 15

	Parts per million
Alkalinity	20
Turbidity	400
Color	6
Iron	0.45
Total hardness	17.5
Chlorides	5

Amount of water	Lact. broth. gas % hours	Endo hours	Lact. broth. gas hours
	24–48	24	24–48
1 c.c.	35–35	100	40
0.1 c.c.	15–15	100	.....
.01 c.c.	0– 0	.....	.....

Calories per c.c. after 24 hours at 37° C. on agar.....300
Red calories per c.c. after 24 hours at 37° C. on Lit. lact. agar.....150
Voges—proskauer; Positive. Methyl Red; Negative

Sample from Tap of (Filtered) Treated Water, April 15

	Parts per million
Alkalinity	20
Turbidity	2
Color	3
Iron	0.45
Total hardness	7.5
Chlorides	5.0

Amount of water	Lact. broth gas % hours	Endo
	24–48	
0.1 c.c.	0– 0	
1.0 c.c.	0– 0	
10 c.c.	0– 0	
10 c.c.	0– 0	
10 c.c.	0– 0	
10 c.c.	0– 0	
10 c.c.	0– 0	

Calories per c.c. after 24 hours at 37° C. on agar.....0

Graph on following page shows water and sewage curve applied to curve of total population during year, from May 1, 1918, to April 30, 1919. The reason for water and sewage curve not following population curve for period June to December was due to the fact that no more water was available since the capacity of pipe was only 3,000,000 gallons per day.

DISPOSAL OF HUMAN, DOMESTIC AND ANIMAL WASTES

Human.—A water carriage sewerage system cares for most of these wastes, operating by gravity except in one small area of camp, where it is necessary to use pumps.

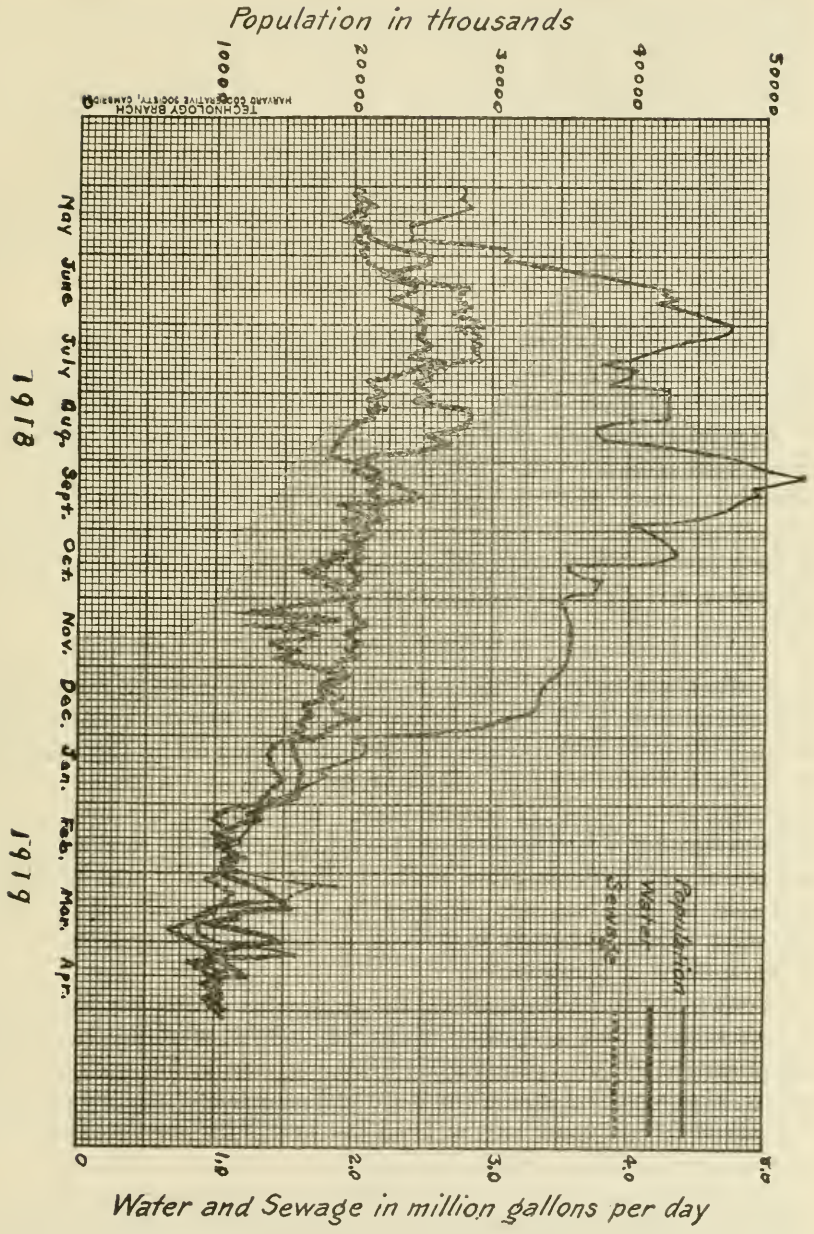
All sewage, which consists of some storm water, ground water, liquid wastes from kitchens and for the most part human excrementitious material, is discharged into a concrete septic tank at the extreme southwestern end of the camp. This consists of eight separate chambers where suspended material, mostly organic in nature, is supposed to undergo sedimentation and digestion before being discharged into Gills Creek, which eventually finds its way into the Congaree River some distance below the city of Columbia.

The treatment of sewage by means of septic tank has not proven satisfactory, one reason being that the tank was undoubtedly too small to care for the work thrown upon it (it was designed to care for wastes from about 40,000 persons) since during the summer and fall of 1918 demands upon it were much increased.

Another important factor operating against the success of the tank was, no doubt, lack of expert supervision.

As a result of inability of the septic tank to fulfil its purpose organic material was deposited all along the banks of Wild Cat and Gills Creeks, also scattered over the land, thus bringing about a nuisance both from the standpoint of odors and attracting and breeding flies.

However, although much organic matter was deposited along the


Population in thousands
10000
20000
30000
40000
50000
TECHNOLOGY BRANCH
HARVARD COOPERATIVE SOCIETY, CAMBRIDGE
May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr.
1918
1919
Population
Water
Sewage
0
1.0
2.0
3.0
4.0
5.0
Water and Sewage in million gallons per day

banks of Gills Creek, so far as can be learned no harm resulted as regards the health of those living along its course. Nevertheless, the above condition was not entirely satisfactory and might under some conditions produce a distinct menace to the health of the inhabitants.

Human excreta was cared for in areas not connected with a water-carriage system by means of fly-proof latrines. More than one hundred of these latrines were maintained during the emergency, being cleaned daily by detail from our Sanitary Corps Detachment. The inside of the seat, box and contents of the pit received a spray consisting of lampblack in crude oil, as a result of which no fly breeding occurred in the contents.

The pits on an average were 6 feet in depth, 14 feet long, by 24 inches in width at the top, and covered by a seat box containing seven seat holes with covers constructed so as to automatically close after use.

This form of latrine, needing no expert supervision, would no doubt prove satisfactory in rural communities having no sewerage system, provided contents were sprayed each day or two with solution of crude oil and lampblack, or the deposit simply covered with a small amount of fresh earth. The factors in favor of the above latrine are the small original cost and ease of maintenance.

DOMESTIC WASTES

Garbage was removed daily from all areas in fly-proof garbage cans to a central transfer station and there turned over to a contractor, who, in turn, removed it to a piggery some 5 miles from camp, disposing of it in the following manner: Scraps from tables, such as bread, meats and vegetables, were fed raw to pigs. Raw meats, fats and bones were rendered in rendering vat under pressure, and grease removed from surface of vat contents after cooling. This eventually was barreled and sold to manufacturing concerns for the purpose of making into glycerine. Other contents of the vat, on settling (tankage), was used in the making of fertilizer.

From reports furnished us by the contractor during the height of the emergency, that is, during the summer and fall of 1918, some 1,800 pigs averaged to gain 1 pound a day on garbage feed; while one barrel of grease, obtained from grease traps at the kitchens and rendering plant, was saved each day and sold at from $50 to $75 per barrel. This was in addition to fertilizer, which in itself is an asset to be considered.

It would appear that the above system is an admirable one, in that it meets the ends of conservation, also removing from the command (or community) what otherwise might prove to be a menace to the health of the inhabitants.

It is appreciated that the cost of such a system might be considered prohibitive by many municipalities at any time other than the emergency period through which we have just passed. However, it is reasonably certain that nearly all costs might be readily covered by the municipality maintaining its own piggery and rendering plant, which should, of course, be maintained on a business basis.

The graph on following page shows amount of garbage in pounds as applied to the total population salvaged in camp during the six-months period, August, 1918, to January, 1919, inclusive.

ANIMAL WASTES

Manure.—All manure was removed from stables, picket lines and corrals daily; being carried to a central designated spot at Auxiliary Remount Depot by organization wagons and there turned over to a contractor, who either had it loaded at once on cars and shipped out of camp to farmers in the surrounding country, or had it dumped on the farm just outside of camp, where it was supposed to be spread and plowed under the same day.

The above methods, properly carried out, dispose of the manure problem in a very effective and sanitary manner.

A compost pile was formed during the latter part of 1918 just outside the limits of the camp (to care for certain surplus manure) against the advice of the sanitary officer, and it has proved very unsatisfactory, since, in spite of half hearted measures to properly care for same, flies have continued to breed during the greater part of its existence.

REFUSE

All trash was removed daily to one of two officially maintained dumps and burned. The dumps were well cared for and gave very little trouble.

ASHES

Coal ashes were used for filling depressions, afterwards being covered with earth.

Wood ashes were reclaimed for soap making.

PAPER

Newspapers were reclaimed, baled and sold. However, this did not prove a profitable undertaking.

FOODSTUFFS

Only canned or pasteurized milk was allowed in camp, and milk, as well as milk products, such as ice-cream, was examined at regular intervals, both in camp and in the city of Columbia.

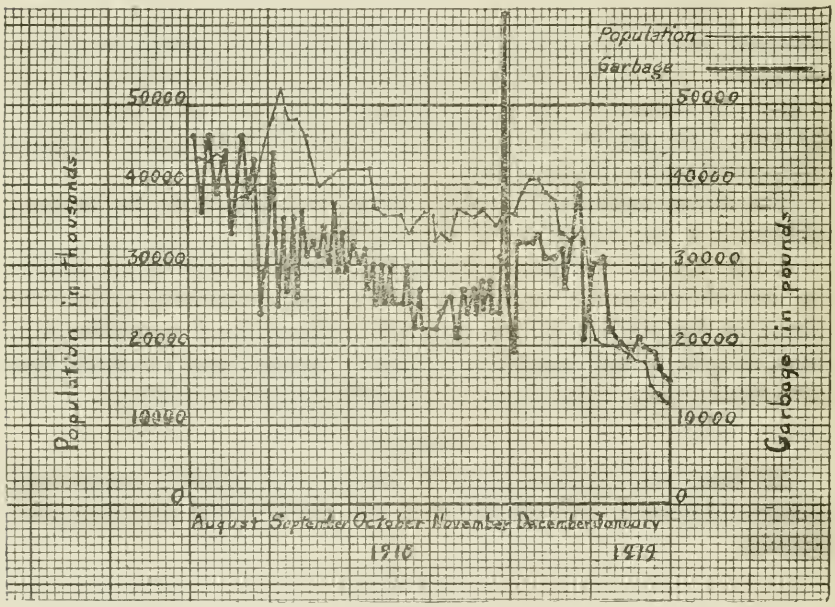
Dairies were regularly inspected by the camp veterinarian, also by inspectors from the local public health force, and many farmers, as a result, instituted improvements, some putting in pasteurizers.

Meats and other foods of a perishable nature were inspected daily by one of our veterinarians.

FOOD HANDLERS

In bakery, kitchens and messes, all those having to do in any way with handling of foods were regularly examined for carriers.

Since January 1, 1919, 502 food handlers were examined; of these 41 were positive for hookworm, while a few showed ascaris. No single case was positive for typhoid or para A or B.



All carriers discovered were removed from the detail having to do with handling of food until, after proper treatment, they were declared no longer dangerous.

SURFACE DRAINAGE

All areas in camp were drained by ordinary earth ditches, some of these being revetted, same emptying into large drains or mains, which in turn discharged into Gill's Creek.

Gill's Creek, a small stream, beginning some miles northeast of camp, flows along a tortuous course to the northern end of camp; then along the western boundary to the southern end, where it turns

and, at a distance of some 9 miles, empties into the Congaree River a few miles below Columbia.

To properly care for surface drainage and sewage from the water-carriage system, Gill's Creek was dredged, at enormous expense by the Government, from Dent's Pond (located west and north of the camp) to the Congaree River, a distance of 8 or 9 miles.

The surface drains cared for all areas in the camp proper, also all swamps in and about the reservation. The swamps, being very extensive, were drained for the most part by means of one or more big main ditches with laterals at convenient intervals or wherever needed. As this section is highly malarial, it was essential that mosquitoes be kept at a minimum, the Anopheles varieties especially; consequently this drainage was necessary to eliminate, as far as possible, all breeding places.

Outside the camp proper, in the extra cantonment zone, work along similar lines was carried on by the United States Public Health Service, the work of the two services frequently overlapping, but all to a common end—the prevention of malaria.

In the period covered by this survey, some 20 miles of new ditches were constructed, while about 25,000 lineal feet of old ditches were cleaned each month.

COMMUNICABLE DISEASES

All cases of illness, whatever the nature, were sent to hospital, no quarters cases being allowed. This method is undoubtedly the ideal one, since an absolute check is maintained on all disease conditions, and the patient is in a position to receive better care than other wise would be the case; furthermore, greater accuracy is obtained as regards diagnosis, since at the infirmaries it is frequently impossible to properly diagnose disease conditions in the early stages.

After the patient was received at hospital and diagnosis made or confirmed, the organization surgeon responsible for sending the case was notified, usually by phone, and later frequently by letter. Where the case was in the class of transmissible diseases, steps were immediately taken to protect the rest of the command by quarantine of barracks or squad room. All contacts were searched for and isolated, appropriate measures being taken to care for contacts according to the nature of the disease.

The advantage of the small barrack as against the big type, or 150-man barrack, was clearly shown in the management of disease control. Where quarantine measures were instituted, the smaller groups involved, with the small or platoon type of barrack, interfered less with troop

movements, drills and the like, and also made the work of the medical officer much easier in reaching contacts.

Where large groups of men were involved, as in the big barrack, proper quarantine measures were not easily maintained, since company commanders objected to the interference with daily routine duties, drills, etc.

Frequently troops under quarantine were transferred from one area of the camp to another without the knowledge or permission of any medical officer. And since undoubtedly conditions as above described will frequently be the case in the future, it not always being possible to obtain proper coöperation between the line and medical officers, the ideal barrack for our future army would appear to be the small type of building—the smaller the better, with kitchen and mess in separate structure.

Undoubtedly, in a big army, many lives could annually be saved and much illness prevented by the use of tents, since contacts here are at a minimum.

The principal diseases and total number of each, for year, were as follows.

Malaria	300
Pneumonias (lobar and broncho)	1,029
Measles	1,205
Mumps	1,428
Influenza	8,697
Veneral diseases	.....

Graph on following page shows morbidity rates for certain diseases duriug the year.

The rapid rise in pneumonia curve during September can be charged to the influenza epidemic.

MALARIA

The total number of cases disgnosed and treated at the hospital was 300. With one exception, none of these was charged against the camp, however, since careful epidemiological investigation proved them to be recurrent cases or new infections received prior to entering the camp.

Routine blood examinations of recruits entering the camp to rule out all possible carriers of malaria was undertaken, but, during the height of emergency, troop movements were so rapid and transfer of men and units so common that, as a result, only a small percentage were checked up. However, these measures, in addition to other anti-malarial work, practically ruled out all chance of new infections.

The Anopheles punctipennis, quadri meculatus and crucians are the common transmitters of malaria in this section, and it was only by

Anti-mosquito Work

What was once a typical swamp transformed by ditching into a beautiful park

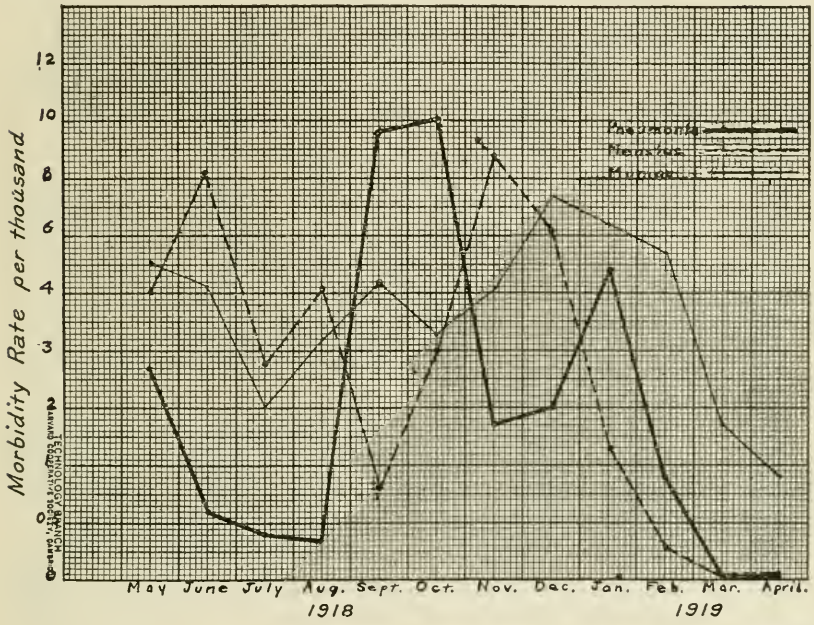
Gill Creek Drainage Canal

Dredged at enormous expense to care for certain wastes from camp

(To face page 375.)

species of mosquitoes were practically eliminated from the camp and area immediately surrounding it.

The following table will give some idea as to findings in malarial investigation carried on during summer of 1918:



Month	Number of examinations for malaria	Number of cases positive	Tertian	Aestivo-autumnal EA	Quartan	Approximate number of men in camp
April	301	12	12	0	0	25,000
May	275	31	31	0	0	32,000
June	249	39	37	2	0	40,000
July	403	57	48	7	1	42,000

Total number of malaria examinations from May 1, 1918, to May 1, 1919	5,277
Total number positive for malaria	300
Types of malaria determined:	
Tertian	203
Aestivo-autumnal	79
Quartan	13
Type not marked	1
Mixed (Aestivo-autumnal—Quartan.)	1
Undetermined	2
Doubtful	1
Total	300

PNEUMONIA

(Broncho and Lobar)

Total number of cases for year, 1,029.

A big percentage of cases were secondary to measles and influenza. During the summer and fall of 1918, recruits came to camp from the rural sections of North and South Carolina, and Florida. Most of this material had a history of never having children's diseases and, as a result, measles spread throughout camp with pneumonia appearing as a complication in many cases.

Some primary cases of pneumonia occurred.

No doubt many factors entered into the increase of pneumonia (measles and influenza, the chief ones), but in addition changed environment, excessive drills, dust and exposure probably encouraged the bringing about of a condition in especially susceptible material, where the organism at fault found conditions unusually favorable.

By exposure is meant not only the effect of undue heat and cold but factors, such as overcrowding.

Overcrowding applies to close contact outside as well as inside of the building and, due to the unusual conditions existing during the rush days of 1918, overcrowding was a condition constantly present and no doubt was a big factor in the spread of transmissible diseases.

Measles and mumps appeared in epidemic form during the year.

The chief factor encouraging the transmissible conditions appears to have been overcrowding, thus favoring contact with susceptible material.

Influenza became prevalent late in the year at the time of the general invasion of the country in September, with a total of some 9,000 cases charged to this camp. Pneumonia (broncho) proved the chief complication.

HEALTH OF THE TROOPS IN THE UNITED STATES DURING 1918

By Major GEORGE A. SOPER
Sanitary Corps, United States Army

THE current statistics of disease for 1918 are now complete, and it is possible for the first time to review the records of the American troops in the United States during the whole calendar year.

This review sets forth facts of much interest, but the statement should be regarded as a preliminary and not a final one. The data which form the basis of it were not collected for the purpose of affording a final measure of the health of the troops, and they doubtless contain errors which make detailed conclusions unwarranted.

The statistics are based on estimates of the number of cases of disease and deaths by the officers in charge of the medical administration of each camp and military station from week to week. These estimates were prepared and sent to the Surgeon General in order to enable him to keep in touch with the state of health at the camps and take such action in relation thereto as he might think necessary.

The final statistics which will appear in the Annual Report of the Surgeon General of the Army will be made up from the personal records of each individual case of sickness. It is expected that they will be of much value, for the personal records possess a wealth of detailed information which the current statistics cannot be expected to contain. The compilation of the final statistics will delay the appearance of the final tabulations for some months. The interpretation of the figures will then consume a considerable period longer.

The value of the current statistics as now collected and tabulated by the Surgeon General lies largely in their immediate availability. They afford an opportunity for a rapid glance over the most essential features of the disease conditions. For this purpose the greater accuracy of the final statistics is not required, nor would their complexity of detail be of value.

The statistics of 1918 which are the subject of this review are based on the weekly telegraphic reports which have been received by the Section on Current Statistics of the Division of Sanitation of the Surgeon General's office at Washington. The statistics used for other years have been taken from the annual reports of the Surgeon General of the Army, Munson's Military Hygiene and the current reports of the United States Bureau of the Census and the United States Public Health Service.

Glancing over the whole subject of disease among the troops in

the United States during the year 1918 in the light of the data here contained, the following facts stand out clearly. The large amount of sickness, which customarily occurs when large numbers of green troops are rapidly mobilized, has not been wholly avoided in this war. The intestinal diseases and malarial infections, which in former wars constituted so conspicuous a cause of disability and death, were practically eliminated. The sickness has been confined almost exclusively to the respiratory type of infections. A large part of the respiratory disease was connected with epidemics, of which the influenza outbreaks which occurred in the spring and early fall were the most conspicuous examples. It is probable that had it not been for the pandemic the death rate would have been little more than one-third of the rate recorded and the admission rate and non-effective rate would have been correspondingly smaller.

I. GENERAL ADMISSION RATES FOR 1918 AND OTHER YEARS COMPARED

The rate of admission to sick report, calculated as so many cases annually per 1,000 of strength, for diseases among all troops in the United States for 1918 was 1507.8. This figure is more than twice that for 1916 (747.6). The rate for 1898 during the epidemics of the Spanish-American War was 1,683.5.

During the period following 1898 there was a gradual decrease in the admission rate for all disease each year, until the low figure (620.1) of 1913 was reached. After that date the increase was slight until 1917 and 1918, when, under conditions of war, the rate became abnormal again.

It appears that an abnormal health situation existed from the malarial infections and intestinal diseases to which the American troops were exposed in and near the tropics as a consequence of the Spanish-American War and until 1913. This situation remained normal from 1913 until the beginning of mobilization in 1917 for the present war.

For a number of months preceding the increased prevalence of disease accompanying the Spanish-American War, the normal admission rate had been about 800 per 1,000 annually. The figure for 1913 was 620.1. The rate for 1916, just preceding the present abnormal prevalence of disease, was 747.6.

From these facts it seems justifiable to assume that the normal annual admission rate for American troops in camps during peace times in the United States lies somewhere between 620 and 800 per 1,000. The year 1916, then, may be considered a normal year. In comparison, the rate for 1917 was one and one-third times the normal, and that for 1918 was more than twice the normal.

The influenza-pneumonia pandemic which occurred during September and October was the principal contributing factor to produce the high admission rate (1,823.9) which prevailed during the last three months of the year.

The rate for the final three months period of 1917, during which time no marked epidemics occurred, was 1,370.1. If 1917 could be considered a normal year under the existing war conditions, and the rate for October, November and December were transposed to the corresponding months of 1918, it would be possible to measure the effect of the pandemic in raising the admission rate during 1918.

Unfortunately, the rates were abnormal during the final quarter of 1917, due to the mobilization of the first draft, which began in September and proceeded with ever-increasing speed during the remainder of the year. The comparison has been made, however, and is given here for whatever value it may possess. The figures for 1917 are taken from the Report of the Surgeon General for that year; the figures for 1918 are from the current statistics.

Annual Admission Rates

Month	1917	1918
October	979.7	3,404.5
November	1,478.4	984.5
December	1,627.3	894.5
Average	1,370.1	1,823.9
Average for 1918 (including pandemic)		1,508.9
Average for 1918 (rates for October, November, December, 1917, substituted)		1,349.4

II. SEASONAL PREVALENCE OF DISEASE

Aside from the pandemic, the months of January, February, March and April saw the greatest prevalence of disease. The respiratory infections predominated during this season. During 1898, the months of greatest morbidity were August and September. The annual admission rates, based upon monthly admissions for 1898 and 1918, may be compared as follows. The figures for 1898 are from the annual Report of the Surgeon General, those for 1918 are based on the current statistics.

Table Showing Monthly Admission Rates for all Diseases Among all Troops in the United States for the Years 1898 and 1918

Month	1898	1918	*Month*	1898	1918
January	817.3	1,687.1	July	1,801.8	1,069.6
February	716.2	1,699.7	August	3,055.3	1,024.8
March	789.0	1,542.2	September	3,261.5	1,501.3
April	781.4	1,662.8	October	2,405.8	3,404.5
May	970.8	1,148.6	November	2,232.7	1,172.7
June	819.0	1,055.9	December	2,551.6	894.5

Weather conditions may or may not constitute a factor in producing the diseases here considered. There is little doubt that different

diseases have a seasonal prevalence. It is hard to conceive of any external influence other than weather that is common to all corresponding monthly periods of the years for which records are available, and which could be a factor in causing the regular annual seasonal occurrence of more or less severe outbreaks of certain epidemic diseases. And statistics show that such regular periodic outbreaks do occur.

Monthly records of cases of the special reportable diseases for the army were not included in the annual reports of the Surgeon General prior to 1900, and it is not possible to trace the seasonal occurrence of epidemics by information from that source. However, interesting compilations and summaries have been contained therein from time to time. A series of charts and tables, showing the average monthly rate of occurrence of certain diseases for the year 1884 and also for the preceding decade (1874 to 1883, nclusive), have been appended to the annual report dated October, 1885. The rates for three typical respiratory diseases, pneumonia, bronchitis and the catarrhal affections have been taken from the report and tabulated as follows:

Month	*Pneumonia Decade*	*Bronchitis Decade*	*Catarrh Decade*
January	8.3	90.1	242.4
February	7.2	72.9	166.5
March	8.2	70.2	187.9
April	5.3	50.6	143.7
May	3.3	36.5	99.5
June	2.5	22.6	61.7
July	1.9	19.9	46.4
August	1.9	22.0	51.9
September	2.1	27.3	76.4
October	3.3	40.9	93.7
November	4.5	62.1	136.1
December	4.7	73.8	192.8

January averaged highest of all of the months during the ten-year period. March came second. February was lower than January and March in pneumonia and catarrh.

It is possible that the statistics are wrong with respect to the February rates and that February is a more unhealthy month than the figures make it appear to be. The shortness of the month may produce a misleading rate. No explanation is given of the method used in computing the monthly rates. The rate for February would not be the same if the period were considered as 28/365th of a year, as it would be if considered one-twelfth of a year. February, being a short month, would have a relatively low rate if considered as the twelfth of a year. It would be more accurate to calculate the rate on the actual number of days in the month in each instance. In the absence of an explanation

constant supervision with vigorous anti-mosquito work that the above of the methods involved in computing monthly rates, this chance of error must be considered. It is quite possible that February may be next to January as the month of greatest prevalence in pneumonia and catarrah as it is in bronchitis.

The five months of greatest prevalence of the disease for the decade mentioned (1874–1883) are, in order, as follows:

Order	*Pneumonia*	*Bronchiti*	*Catarrhus*
1	January	January	January
2	February	December	December
3	March	February	March
4	April	March	February
5	December	November	April

A compilation has been made of the cases of bronchitis, pneumonia and influenza in the Army for the period 1900 to 1913, inclusive. The so-called "catarrhus" which was mentioned in the earlier reports of the Surgeon General's Office was dropped in 1893 and influenza was placed upon the records in 1892. Inspection of this compilation shows that the January rates for bronchitis and pneumonia exceeded those for any other month. In the case of influenza, February was slightly in excess. During the fourteen years the high points have been distributed among the months as follows:

Influenza	*Bronchitis*	*Pneumonia*
January.....5 years	January.....7 years	January.....6 years
February.....6 years	March.....3 years	March.....3 years
March.....2 years	February.....2 years	February .....3 years
December.....1 year	December.....2 years	April..... 1 year
		September.....1 year

To measure the extent of seasonal influence upon the occurrence of these respiratory diseases it is well to study the relationship of the diseases one with the other. Let us assume that the kind of weather that commonly prevails in January is most conducive to the spread of certain diseases. In an early or belated winter the period of typical January weather may be moved forward or backward as the case may be. This, however, is not thought to be the most important reason for the delay of infections that commonly occur as sequelae to less serious respiratory affections.

Pneumonia should be given a prominent place in this class of diseases. In April, 1909, the annual peak of pneumonia was reached in the Army. There was no unusual prevalence of bronchitis and influenza during the same month, but rather severe epidemics of each occurred during February. Influenza, bronchitis and pneumonia all had their highest prevalence during January of the years 1901, 1911 and 1913. Influenza

and bronchitis were both highest during January, 1908, and the peak of pneumonia followed in February of the same year. The high prevalence of pneumonia during January, 1913, was preceded by peaks of both influenza and bronchitis in December, 1912. The following table illustrates a possible relationship of influenza, bronchitis and pneumonia:

MONTHLY PEAKS OF INFLUENZA, BRONCHITIS AND PNEUMONIA

JANUARY			FEBRUARY			MARCH			DECEMBER		
Influenza	*Bronchitis*	*Pneumonia*	*Influenza*	*Bronchitis*	*Pneumonia*	*Influenza*	*Bronchitis*	*Pneumonia*	*Influenza*	*Bronchitis*	*Pneumonia*
1891	1901	1900	1903	1902	1904	1900	1906	1902	1912	1908	
1902	1902	1901	1904	1904	1903	1909	1909	1903		1912	
1908	1908	1905	1905		1910	1914	1910	1906			
1908	1907	1911	1906								
1911	1908	1912	1907								
1913	1911	1913	1910								
	1913										

Statistics for 47 large cities of the United States add to the evidence of the seasonal prevalence of the respiratory diseases. During the period of 1910 to 1916, inclusive, the month of greatest prevalence of the special diseases has been as follows: Influenza—January (33 cities); Bronchitis—January (20 cities); pneumonia—January (24 cities).

In summarizing the effect of weather upon disease, the following possible relationships may be noted: Inclement weather increases susceptibility to respiratory diseases in the already susceptible individual; it may cause some to become susceptible by lowering the physical resistance to disease generally; changeable weather is an indirect factor in the distribution of disease, since it affects the degree of crowding among people; inclement weather increases the virulence of certain epidemic diseases by increasing the distribution of the virus and increasing the susceptibility of the exposed persons; facility in distribution and greater susceptibility of those attacked tend to produce a more virulent strain as an epidemic disease develops. The writer does not advance these theories as his own: he merely mentions them as common beliefs which may or may not contribute to a better understanding of the observed data.

III. LOSS OF TIME FROM SICKNESS

The average non-effective rate for the year just ended was 47.1 per 1,000. This means that, on each day during the entire annual period, there was an average of more than 47 men of every 1,000 on sick report. They were either in hospital or quarters.

If this figure be multiplied by the number of days (365), and the product divided by 1,000, it will be found that the average time lost on account of sickness by each man in the Army in the United States was 18.07 days. This figure is nearly double that for 1917 when each man in service lost 9.19 days. Comparisons with other years have been

tabulated as follows: 1896, 12.43 days per man; 1897, 13.08 days per man; 1916, 11.20 days per man; 1917, 9.19 days per man; 1918, 18.07 days per man.

This figure appears to be unusually high when compared with the time lost by the average working man of military age. No estimate has been found for the American working man, but Paget has given the following figures representing days lost by English working men "annually according to age": 20 years—4 days; 20 to 30 years—5 to 6 days; 45 years—7 days.

The proportion of days of sickness to death among troops in the United States Army has been estimated by Billings to be 3,867 to 1; in civil life, 730 to 1. During 1918, the proportion for the Army was 761 to 1. The great variation between the figures for the Army and that for civil life as estimated by Billings is largely due to the fact that only comparatively severe cases of sickness among civilians receive the attention of physicians and are reported, while, in the Army, men are ordered on sick report for the slightest disability, and each case is brought to the attention of the organization surgeon.

During 1918 the proportion for the Army was only slightly greater than that for civil life. This was due to the large number of deaths with short periods of sickness which occurred in the influenza-pneumonia pandemic.

IV. THE MORTALITY RATE

The death rate from all causes, during 1918, has been nearly four times greater than that recorded for 1917 and nearly five times that for 1916. The rate for "disease only" has been correspondingly high. The death rates for 1918 and other years, compared, is as follows:

Year	*All causes*	*Disease only*
1918	24.4	21.23
1917	6.3	5.3
1916	5.2	5.1

During the period September 1 to December 31, 1917, in an average strength of approximately 1,000,000 troops, 2,047 deaths occurred from all causes. Had the strength been as great as the average for 1918 (1,300,000), the same death rate would have caused 2,661 deaths.

There was a total of 23,615 deaths reported during the last four months of 1918. A fair approximation of the excess deaths during 1918, and caused by the pandemic, is 21,000. Without the occurrence of the pandemic, it is estimated that about 9,200 deaths would have been recorded during the year. The annual death rate would then have been 7.1. This would have been a little more than one-third the rate which occurred for the year (20.3).

During the year there were reported by daily and weekly telegram a total of 30,163 deaths from all causes among troops in the United States. This figure, large as it appears, is thought to be very conservative.

The annual death rate recorded by the Census Bureau for 47 large cities of the United States, during 1918, was 19.6. The rate for the camps seems high in comparison with the rates for cities when it is considered that the extremes in the age scale and the physically weak are almost entirely eliminated from the Army, and at the same time left to swell the sick and death rates of the civilian population. The comparison is still more unfavorable to the camps when it is considered that the deaths under one year of age comprise 12.5 per cent of all deaths reported by the cities.

The highest annual death rate for any city was 26.8; this was reported by Baltimore. The rate reported by Baltimore for 1917 was 18.9. Nashville was a close second, with a rate of 26.4 per thousand. The following table gives a comparison of seven of the highest rates in the cities and in the camps for the year 1918:

City	*Death rate*	*Camp*	*Death rate*
Baltimore	26.8	Sherman	39.1
Nashville	26.4	Dodge	38.6
New Orleans	25.9	Beauregard	38.3
Pittsburgh	25.4	Grant	36.1
Philadelphia	24.2	Dix	29.7
Rochester	23.6	Hancock	29.6
Washington, D. C.	23.6	Taylor	28.2

In the cities, as in the camps, the death rates for 1918 were higher than for the preceding year. During the three-months period of the influenza-pneumonia pandemic, as many deaths resulted in the cities as would have occurred from all of the respiratory diseases together during a period of 18 months if the average rate of former years had prevailed.

V. THE PRINCIPAL CAUSES OF DEATH

Pneumonia was the principal cause of death by disease in the Army in America. It accounted for 24,538 deaths, or 81.4 per cent of all deaths that occurred among the troops in the United States during the year. A larger part of it was due to the influenza pandemic.

Influenza was the second most frequent cause of death, according to the returns. There were 1,133 deaths attributed to influenza.

Of the other diseases causing death, meningitis, to which 883 deaths have been accredited, stands third. The following tabulation gives the prevailing causes of death as recorded during 1918:

Disease	*Total deaths*	*Disease*	*Total deaths*
Pneumonia	24,538	Scarlet fever	69
Influenza	1,133	Typhoid fever	42
Meningitis	883	Dysentery	10
Tuberculosis	383	Other diseases	1,486
Empyema	308	External causes	1,033
Septicemia	112	Suicide	90
Measles	76		
		Total	30,163

Meningitis had the highest case fatality of any infectious disease that occurred among the troops in the United States during 1918. Of all the cases of meningitis reported during the year, 42.1 per cent resulted in death.

Pneumonia was a very fatal disease; 35 of every 100 attacked died. In typhoid, 10 per cent of all cases were fatal.

The following table shows the admission rates, death rates, and present case fatality of the most important epidemic diseases in 1918:

Disease	*Admission rate*	*Death rate*	*Per cent deaths*
Meningitis	1.59	0.67	42.1
Pneumonia	53.49	18.80	35.1
Typhoid	0.30	0.03	10.0
Dysentery	0.56	0.007	1.3
Scarlet fever	5.23	0.054	01.03
Measles	34.05	0.57	0.17

The rates represented in this table are mathematically correct, but they should be accepted with reservation as indicators of the relationship of the special diseases to one another and in their bearing upon the general health situation.

For example, in the consideration of measles, it might seem fair to infer from the foregoing table that measles was not a very important disease of those least fatal. To suppose this to be the fact would be to commit a grave error. Measles has been one of the most serious diseases that have affected our troops. During 1917, 47,573 cases of measles were reported among the troops in the United States. Nearly 10 per cent of all cases of disease reported during the year were diagnosed as measles. There were 3,415 complicated cases divided as follows:

Disease	*Cases*
Measles and broncho-pneumonia	1,372
Measles and lobar-pneumonia	703
Measles and other complications	1,340

There were performed, during 1917, 199 surgical operations in measles with complications; 41 of these surgical patients died; 27 received disability discharge on account of complications attributed to measles.

During 1917 there were recorded 947 deaths from measles, both complicated and uncomplicated cases. This figure represents 31.7 per cent of all deaths from disease that occurred:

Deaths from Measles, 1917

	Deaths	*Rates*
Total complicated	927	1.66
Total uncomplicated	20	0.04
Complications		
Broncho-pneumonia	622	1.11
Lobar-pneumonia	266	0.48
All others	39	0.07

The admission rate for measles, including complicated cases, during 1917 was 85.15, the death rate was 1.7, and the case fatality was 1.9 per cent. The case fatality for complicated cases alone was 36.2 per cent. Correspondingly high rates for 1918 would give measles much prominence among the important causes of disability and death.

There are other reasons why it is not advisable to adhere too closely to the bare statistical evidence in making deductions. Admission and death rates for many diseases are too high as compared with the rates for all diseases and the special diseases, because when a man on sick report develops two or more different diseases no allowance is made for this fact in the records of current statistics. A typical case will serve to illustrate this point. A patient is admitted to hospital for scarlet fever and reported as such. After ten days he contracts measles, and is then taken up as another admission, this time for measles. Finally, pneumonia develops and the admission is recorded for a third time. If at last the patient dies, pneumonia being the immediate cause of death, pneumonia is given as the cause of death in the telegraphic reports, while the contributory causes, scarlet fever and measles, are disregarded. As a result of this course the admission rates for scarlet fever, measles and pneumonia are too high, and the pneumonia death rate is raised. The disproportionate increase of the admission rates of mumps and measles over the death rates for the same tends to increase their case fatality and reduce them unjustly to the plane of relative unimportance that they now hold in the scale of communicable diseases.

Next in importance to the loss of the lives of troops by disease is the loss of time on account of disability produced by disease. While measles, mumps, bronchitis, influenza and so-called minor affections have not figured prominently in the category of fatal diseases, they have been found to be the chief factor in sustaining a high, non-effective rate. The camps have rarely, if ever, been entirely free from scattered cases of these infections. They especially attack the new men. The mobilization of recruits in a camp can be effectively traced by the successive waves of mumps and measles which occur.

The following table has been prepared to show the principal diseases causing disability among troops in the United States during 1917. The aggregate of all days lost by each soldier during the year is given:

Disease	*Man-days lost*	*Disease*	*Man-days lost*
Measles	536,400	Disease of tonsils	217,249
Gonococcus infection	454,703	Syphilis	175,816
Mumps	254,523	Pneumonia	174,505
Bronchitis	229,199	Influenza	133,297

While the final records are not yet available for 1918, it may well be assumed that the non-effective rate for these minor epidemic diseases will be found to be as high in 1918 as it was in 1917. The current statistics indicate that the admission rates will correspond with and, in some instances, possibly exceed those of the preceding year.

VI. THE PREVALENCE OF THE RESPIRATORY INFECTIONS DURING 1918

It is impossible to estimate accurately the prevalence of respiratory diseases and infections in the Army during the annual period of 1918. The weekly and daily telegraphic reports which serve as the basis of the current statistics did not include influenza or bronchitis until the outbreak of the pandemic in September. No reports were made of mumps. The wave of influenza which swept the camps in the spring was not generally reported.

Nevertheless, the increases in the general admission rate during the winter of 1918, and again during March and April, are significant of the presence of influenza. Reports rendered by camp surgeons, camp epidemiologists and inspectors from the Surgeon General's Office repeatedly mentioned an unusual prevalence of influenza, bronchitis, bad colds, grippe, rhinitis, etc., during the winter and spring periods. As a further evidence of the presence of influenza, the pneumonia rates were unusually high during March and April.

On April 17, 1918, a report was submitted by the present writer to the Surgeon General from Fort Oglethorpe, Georgia, on an investigation of an explosive epidemic of influenza. The distribution of the disease, rapid spread, incubation period, initial symptoms, diagnosis, and predisposing housing and weather conditions were discussed. There was later reported from Camp Sevier an epidemic which spread with lightning-like rapidity over many organizations. The symptomatology was like that reported from Oglethorpe. A few cases of post-influenza pneumonia occurred in each instance.

At least ten camps reported outbreaks at this time. An increased prevalence of pneumonia as a complication was mentioned in most of them. Whether from the presence of influenza or not, the prevalence of pneumonia in the army as a whole increased at this time. The

following table shows the camps which reported an unusually high incidence of influenza and other respiratory infections during the spring of 1918, and the months during which such conditions existed:

Camp or station	*Month*	*Camp or station*	*Month*
Oglethorpe	March	MacArthur	March
Sevier	March	Sheridan	April
Newport News	March	Shelby	April
Bowie	March	Custer	April
Cody	March	Fort Riley	June

Of much interest in connection with the influenza wave which occurred in the spring of 1918 is the location of the camps where influenza was reported. All of the camps reporting epidemics during March and April were located in the southeastern group of states and in Texas, with the single exception of Camp Custer, Michigan.

The epidemic of undetermined disease which occurred at Fort Riley, Kansas, as described in a report dated June 4, 1918, bore a strong resemblance to the epidemic of influenza that occurred throughout the United States in September and October. The writer of that report states that nasopharyngitis, tonsillitis and bronchitis with much coughing and expectoration (graveyard cough) were very prevalent. The acute attack resembled the "so-called respiratory form of grippe." The onset was often exceedingly sudden, usually without chill, followed by high fever and prostration out of proportion to the amount of physical evidence of infection. Nearly every newcomer developed an attack.

All of the pneumonia which occurred in 1918 was not, of course, attributable to influenza. During July and August the rate for the troops in the United States was above the normal for the summer season. The rates in the following camps were especially high: Cody, Pike, Travis, Taylor, Gordon, Sevier, and Newport News.

In some distant stations outside of the United States, influenza outbreaks occurred during midsummer. Reports covering influenza during the summer were received from the camps and stations of the Panama Canal Zone. Cases occurred at Camp E. S. Otis, during May, steadily increasing toward the end of the month. A rather severe epidemic occurred early in July. The peak (140 daily admissions) was reached on July 5. Scattered cases were reported during August, but no increase occurred in September. An increased rate of influenza during June and July was recorded in the camp at Empire, C. Z. Fort Sherman, C. Z., reported a mild epidemic during August and September.

The great influenza-pneumonia pandemic which swept the world in 1918 invaded the army camps of the United States chiefly during

September and October. In the opinion of many, the infection of the early fall was a recurrence of the wave that had prevailed during the spring. Others believed that the pandemic was the result of the introduction of an entirely new strain of the virus. Reports show that nearly 25,000, or about 30 per 1,000 of all troops in the United States, died of influenza and pneumonia during the last four months of the year.

Coincident with the pandemic in the camps, the civilian population throughout the country was attacked by the influenzal infection. While complete records of cases are not yet available, and probably never will be, the progress of the epidemics in 47 of the large cities has been statistically shown by a weekly "Health Index" issued by the Bureau of the Census. Only deaths have been included in the report. It has consequently been necessary to use death rates as an indicator of the incidence of the disease.

The epidemics of cities and camps in the same section of the country have generally reached their peaks within the same week. A summary of the data contained in the weekly "Health Index" was issued by the Census Bureau, covering the period of the pandemic, September 14 to November 30, inclusive. The death rates for the camps have exceeded those for the cities shown in the following table. This table compares the highest cities with the highest camps:

Cities	*Death rates*	*Camps*	*Death rates*
Philadelphia	7.6	Lee	42.4
Pittsburgh	7.6	Cody	34.1
New Orleans	6.8	Sherman	33.6
Syracuse	6.6	Grant	31.4
Baltimore	6.5	Beauregard	31.3
Boston	6.2	Dodge	25.3
Nashville	6.1	Dix	24.6

It has been possible thus far to make estimates which are only rough approximations of the total number of deaths in the United States attributable to influenza and pneumonia during the pandemic. The U. S. Public Health Service has made a conservative estimate that the deaths due to the pandemic in the United States was about 350,000. The New York Life Insurance Company has placed the number at 460,000. It is doubtful if this larger estimate is great enough.

VII. TROOP MOVEMENTS AND THE SPREAD OF DISEASE

It is to the recruiting of the Army and the movement of troops from one point to another that the high rates of disease are mainly attributable. The chief means by which the virus and the suceptible person are brought together is contact. The more frequent and more intimate the association, the greater the chances of infection. The movement of troops increases the range of contact among soldiers, thereby lessening

the possibility of those not immune to escape the disease. It is quite certain that if the soldiers in a camp were to remain for a period of a few months without accessions of new ones, the sick rates would reach a normal, and that this normal would be lower than that existing in the civilian population.

The constant influx of recruits into the camp and the numerous transfers of large and small detachments from one station to another, followed by the successive steps en route to the front, have all assisted in elevating the morbidity, non-effective, and mortality rates during the period of the war.

VIII. THE CRITICAL PERIOD FOR THE RECRUIT

The first three months a man spends in a military camp may be called his critical period. New experiences follow each other in rapid succession during this time. There is reason to believe that his unaccustomed environment makes him especially exposed to disease.

The drafted man is summoned by his local board and transported to to the nearest camp in company with many others. These men soon find that they have much in common. They feel that they are all embarking upon a great adventure. In face of the uncertainty of the future there develops a disregard for ideals and standards of living which had been of foremost consequence to them.

The men arrive in camp exhausted. They are assembled in a detention area with thousands of others. They submit to the unfamiliar rules of discipline and are listless and careless in their association with each other. There are long periods of standing in line for the physical examination and the issue of clothing and equipment. At night they remain in the prescribed area, where they are usually to be found packed into a Y. M. C. A. hut.

After the first week of detention, a temporary organization of the recruits for drill and instruction is usually made. The hours on duty and the extent of work assigned are regulated by the commanding officer of the camp. It seems unavoidable, either through lack of proper personal precaution, inclement weather, or for other reasons that the men should become overheated, chilled, neglectful of removing wet clothing and shoes; be permitted to sleep without proper ventilation, or with insufficient bedding; or in many other ways be subjected to unaccustomed exposure.

Finally, when the men are assigned to permanent organizations, hours of duty become longer and drill grows heavier. The climax of the critical period is now reached. During the time of detention, the men who through natural or acquired immunity were not suscepti-

ble to the common epidemic affections were reasonably safe. Now it is a question of constitutional vitality. The fit survive and are able, through muscular exercise, wholesome food, and regular hours, to build up a resistance against exposure and exhaustion.

IX. MOBILIZATION AND DISEASE IN 1917

The Army increased in strength from 217,272 in January, 1917, to 1,538,203 in December of the same year.

The steps in the mobilization of the Army can be traced by the curve of admission of the common epidemic diseases and more especially by the rise and fall of the venereal rate. Most cases of the latter, however, were contracted prior to enlistment or induction and were discovered during the careful physical examination which the men passed through upon entrance to the service. The following table shows the monthly incidence of cases of the five most prevalent communicable diseases:

Month, 1917	*Measles*	*Pneumonia*	*Mumps*	*German measles*	*Venereal diseases*
January	632	265	331	33	1,112
February	1,195	233	376	144	928
March	817	252	350	181	762
April	764	223	495	166	1,276
May	1,472	210	638	362	1,566
June	1,561	139	775	425	2,181
July	1,007	121	765	289	3,112
August	678	163	585	191	4,706
September	998	290	746	328	11,129
October	4,447	1,015	1,713	367	15,815
November	21,717	2,443	4,257	2,163	12,402
December	12,285	3,078	10,694	4,333	8,937
Total	47,573	8,432	21,725	8,982	63,557

The largest increment of recruits occurred in September. The greatest prevalence of measles was reported in November. Pneumonia, mumps and German measles reached their peak in December. It is not likely that severe epidemics of these infections would occur in a body of recruits during the first month. If it be assumed that all other conditions incident to the outbreak and spread of these diseases remained constant during the period, two months has been the minimum period for the development of greatest momentum according to the above statistics. About one-fourth of all pneumonia cases have occurred as complications of measles, which partially accounts for the fact that the period of high prevalence of pneumonia should follow that of measles. Weather conditions and a longer incubation period may have caused the delay in mumps.

A more intimate study of the different camps indicates the same relationship between influx of recruits and the epidemic situation. At Camp Lee, 18,721 recruits were received during the period September 19 to 24, inclusive. Admission for measles increased from one case in October to 206 in November. Mumps jumped from 7 to 276 admissions during the same period and reached 990 during December. The following statistical comparison has been made of strength and disease at Camp Lee:

	Sept. 5–10	Sept. 19–24	Oct. 3–8	Oct. 27–31	Nov.	Dec.
Increment	2,340	18,721	9,478	9,050		
Disease:						
Measles	3		1		206	218
Mumps	1		7		276	990
German measles	..		..		10	249
Pneumonia	2		1		17	49

The situation at Camp Lee is typical of all National Army camps. There was, however, a marked variation in the severity of the epidemics in the different camps. The relative immunity of the men composing the different commands was probably responsible for this variation. It has been observed that camps suffering least from the measles and mumps were those which received men from the more densely populated areas. In the following table the camps have been grouped according to the areas represented by their personnel. Almost without exception the rural camps have shown higher rates for measles and mumps.

Urban		*Rural*	
Upton	Custer	Taylor	Greene
Devens	Lee	Jackson	Beauregard
Meade	Sheridan	Dodge	Doniphan
Grant	Shelby	Funston	Bowie
Dix	MacArthur	Gordon	Cody
Sherman	Wadsworth	Travis	Sevier
		Lewis	Kearney

X. TROOP MOVEMENT FROM CAMP TO CAMP

Inter-camp troop movements have been mentioned as a means of increasing a soldier's circle of contact with others, and, in so doing, assist in the distribution of infection.

During the period intervening between the first cases at Devens and the period when the quarantine measures became effective, detachments were sent from Devens to Camps Taylor and Grant. It is significant that Grant was the first middle-western camp to report epidemic conditions. It was reported from Camp Taylor that men transferred from Devens to the Central Officers' Training Camp were probably responsible for the first cases of influenza there.

Camps Grant and Taylor both repeated the mistake made by Camp Devens by sending out several detachments to other camps before the situation was recognized as dangerous. Camp Taylor appears to have infected Camp Kearney, and Camp Hancock, Bowie and MacArthur trace their epidemics from the arrival of the infection with men transferred from Camp Grant.

Other instances of the spread of infection by the movement of troops from camp to camp could be cited, but the fact is so evident that further proof would appear to be unnecessary.

XI. HEALTH CONDITIONS IN THE TENT AND BARRACK CAMPS COMPARED

The cantonments provided in the United States for the preliminary training of troops may be divided into two general groups; those consisting largely of tents and those in which the men were housed in frame barracks. Most of the former group were located in the southern states and were used originally for the training of the federalized National Guard troops. The latter group were generally distributed throughout the country and were used almost exclusively for the training of troops mobilized by the selective draft.

In the following calculations there have been selected fifteen of the typical tent camps and eighteen of the more permanently constructed barrack cantonments, in order to compare one group with the other.

	Tents	*Barracks*
Admission late	1,403.1	1,616.8
Death date	17.1	23.88

The admission rate for the barrack camps was in excess of the corresponding rate for all troops in the United States (1,508.9), while that given for the tent camps was considerably less. The same difference may be noted to a still greater degree when the death rates are compared in like manner. The rate for all troops as previously stated in the review was 20.3.

The highest admission rate recorded in any tent camp was 1,908.2 at Beauregard, while Pike, the highest of the barrack camps, reached 2,979.9. The highest death rate in the latter group (39.08 at Sherman) exceeded that reported by Beauregard (38.26) which stood first among the tent camps.

XII. THE SPECIAL DISEASES IN TENT AND BARRACK CAMPS

It has been noted that the barrack camps had the greater prevalence of respiratory disease and the lesser amount of disease affecting the digestive tract. It is thought by some that the location of the camps and the geographical origin of the personnel may have been largely

responsible for these differences. Others are inclined to believe that greater congestion in the barrack camps contributed to the greater prevalence of the respiratory infections. The part played by the intestinal diseases in raising morbidity and mortality rates in the tent camps, where they figured more prominently, is a negligible factor, and makes their further consideration unimportant.

Seven camps of the barracks group (Custer, Travis, Meade, Dodge, Taylor, Funston, Devens) had higher admission rates for pneumonia than Cody (81.43), the highest of the tent camps.

The relative prevalence of influenza and pneumonia in the tent and barrack camps during the pandemic has been discussed in detail in the monthly reviews that were written during the progress of the pandemic. The following comparative rates were contained in the report covering the pandemic from the outbreak up to November 1:

	Tent	*Barracks*
Influenza cases	69,761	158,104
Pneumonia cases	9,740	30,099
Total deaths	2,923	10,535
Per cent having influenza	22.2	21.5
Per cent influenza having pneumonia	13.9	19.0
Case fatality of pneumonia	30.1	35.0

The statistical evidence seems to indicate that the respiratory infections in general found fewer susceptibles in the tent camps. Various explanations have been attempted. It is probable that a combination of causes exists.

XIII. COMPARISON OF THE HEALTH OF TROOPS IN DIFFERENT CAMPS

It is not considered to be practicable in a brief review of the general health conditions, to make a detailed study of each camp. However, extreme situations deserve to be mentioned here. In the following tabulation the ten camps leading in admissions and deaths from disease have been arranged in order:

Order of rates	*Admissions*	*Deaths*	*Order of rates*	*Admissions*	*Deaths*
1	Pike	Sherman	6	Travis	Hancock
2	Upton	Dodge	7	Logan	Custer
3	Gordon	Beauregard	8	MacArthur	Taylor
4	Las Casas	Grant	9	Lewis	Funston
5	Beauregard	Dix	10	Taylor	Meade

Pike had the highest admission rate for the year. Pike is a barrack camp located at Little Rock, Ark., and was used for the training of drafted men from Arkansas, Louisiana, Mississippi and western Alabama

The average strength of command during 1918 was 36,280. The annual admission rates for each of the special diseases exceeded the average for all troops. The measles rate for the year was nearly three times greater than the average for all troops, and only two camps were higher. Pike stood ninth on the list of camps arranged according to the prevalence of influenza during the pandemic.

Sherman had the highest death rate of any camp. Sherman is located at Chillicothe, Ohio, and the average strength of 32,460, during the year, was made up largely of drafted men from Ohio and Pennsylvania. The per cent case fatality of pneumonia and influenza was higher at Sherman than in any other camp during the pandemic.

Beauregard and Taylor are the only camps to appear among the highest ten, both in admissions and in deaths. Each of these camps has exceeded the average admission rate for every one of the special reportable diseases and have had more than the average amount of undefined disease on the telegraphic reports.

XIV. THE PREVALENCE OF THE SPECIAL DISEASES IN THE CAMPS

The following table has been prepared for the consideration of the special reportable diseases as they occurred in the different camps; the ten camps having the highest incidence have been arranged in order under each disease:

Order of rates	*Pneumonia*	*Meningitis*	*Measles*	*Typhoid*	*Dysentery*	*Malaria*
1	Custer	Beauregard	Las Casas	Bowie	Hoboken	Beauregard
2	Travis	Jackson	Gordon	Lee	Newport News	Pike
3	Hoboken	Taylor	Pike	Newport News	Beauregard	Shelby
4	Meade	Greene	Funston	Sevier	Travis	Sevier
5	Taylor	Gordon	Dodge	Dix	Shelby	Las Casas
6	Dodge	Pike	Taylor	Travis	Wheeler	Johnston
7	Devens	Funston	Jackson	Gordon	Bowie	Wheeler
8	Funston	Travis	Johnston	Wadsworth	Fremont	Newport News
9	Cody	Johnston	Hoboken	Jackson	Dix	Travis
10	Lewis	Sevier	Sheridan	Pike	Greene	Logan

The camps which stand out most prominently in all of these lists are Hoboken, Taylor, Funston, Travis, Beauregard, Jackson and Newport News. Each camp appears on three or more of the lists. No camp of the southeastern group was on the list of the first ten pneumonias. Under meningitis, six of the first ten were in this group. Hoboken was the exception under measles, all of the other camps with high rates being located in the south and middle west. The typhoid and malaria lists included only camps in the southeastern and southwestern sections with the single exception of Las Casas, which was fifth in the incidence of malaria.

Camps	*All Dysentery*	*Pneumonia*	*Meningitis*	*Measles*	*Typhoid*	*Dysentery*	*Malaria*	*Deaths*
Beauregard.....	1908.2	74.35	6.52	22.11	0.26	4.36	28.62	38.26
Bowie.....	1673.3	39.92	1.14	9.72	1.24	0.78	3.45	11.46
Cody.....	877.6	81.43	1.56	23.88	0.16	0.17	3.86	21.32
Greene.....	1676.2*	64.36	2.81	21.93	0.17	0.52	4.62	24.24
Fremont.....	1012.1	48.32	0.72	36.56	0.21	0.63	1.09	13.39
Hancock.....	1075.3	48.23	1.18	18.97	0.09	0.03	1.44	29.63
Kearney.....	1196.6	44.25	0.55	19.26	0	0	1.42	11.24
Logan.....	1800.9	38.14	0.84	35.42	0.22	0.33	5.98	89.0
MacArthur.....	1756.3*	46.32	0.49	30.47	0.19	0.33	1.31	17.25
McClellan.....	1338.2	66.19	1.08	35.03	0.35	0.04	3.42	14.62
Sevier.....	1310.9	48.39	1.84	30.93	0.51	0.09	8.82	19.82
Shelby.....	1524.9	22.38	0.89	24.86	0.37	2.04	11.95	7.08
Sheridan.....	1368.3	47.91	0.34	35.63	0.09	0.14	2.17	11.16
Wadsworth.....	1035.9	43.82	0.87	14.42	0.40	0	1.64	10.58
Wheeler.....	1491.5	68.14	1.23	0.91	0	0.92	6.41	17.38
Custer.....	1187.8	103.26	0.68	20.24	0.14	0.05	2.25	28.42
Devens.....	1343.2	86.41	1.43	29.82	0.19	0.02	4.26	24.93
Dix.....	1449.8	59.32	1.21	18.42	0.51	0.59	1.82	29.72
Dodge.....	1506.8	88.23	1.14	72.41	0.09	0.03	0.86	38.62
Funston.....	1585.2	82.14	2.05	73.22	0.05	0.05	0.59	26.58
Gordon.....	2008.5	43.19	2.43	85.54	0.43	0	4.67	13.82
Grant.....	898.1	40.26	0.73	34.82	0	0.02	0.68	36.14
Jackson.....	1000.0	49.39	6.43	53.45	0.38	0.34	2.45	19.35
Johnston.....	1334.9	38.21	1.86	46.25	0.34	0.05	6.46	11.72
Las Casas.....	2004.8*	52.83	0.00	92.48	0	0	7.86	17.46
Lee.....	1403.2	52.21	1.24	36.21	0.68	0.41	0.81	22.23
Lewis.....	1733.7*	75.29	1.09	28.42	0.05	0.08	1.01	9.43
Meade.....	1021.5	98.76	1.83	21.84	0.12	0.13	1.18	26.42
Pike.....	2979.9	67.21	2.26	82.14	0.38	0.38	12.43	23.82
Sherman.....	1571.3	65.41	0.89	26.44	0.15	0.06	0.71	39.08
Taylor.....	1718.7	90.64	2.83	63.14	0.12	0	0	28.21
Travis.....	1821.2	100.42	1.91	19.83	0.50	2.45	5.86	16.32
Upton.....	2534.3	42.18	0.78	10.86	0.08	0.09	2.48	17.52
Hoboken.....	.....	105.82	1.64	43.35	0.05	6.06	2.59	26.07
Newport News..	.....	50.18	1.23	27.76	0.62	4.82	6.06	17.82
Syracuse.....	.....	182.28*	0.[illegible]	12.5	0	0	0.	78.91*
Forrest.....	2046.8*	49.38*	0	12.36	0	0	0	53.57
Greenleaf.....	1293.0*	67.83	0.83	42.00	0	0.43	1.59	19.31
Humphreys.....	1469.8*	72.86	0.56	14.85	0.03	0.32	0.63	59.09*
Eustis.....	1454.9*	34.82	0	21.81	0	0.36	4.12	38.81*

* For period of six months ending December 27, 1918, only.

XV. DISEASES IN THE EXPEDITIONARY FORCE IN FRANCE

The current statistics relative to the health of troops overseas during 1918 are inadequate for thorough study and comparison, yet inasmuch as the annual rates for the special diseases were carried each week in the consolidated report of the Section of Current Statistics, some notion of the diseases in the expeditionary force in France will be given here.

The average annual rates for 1918 for six of the reportable diseases have been compared with those given for troops in the United States as follows:

ANNUAL RATES OF SPECIAL DISEASES, 1918

Disease	*U. S.*	*France*
Meningitis.....	1.59	2.42
Pneumonia.....	53.49	26.48
Typhoid.....	0.30	0.29
Dysentery.....	0.56	2.24
Scarlet fever.....	5.23	5.79
Measles.....	34.05	11.01

Meningitis, dysentery and scarlet fever were more prevalent in France, while rates for pneumonia, measles and typhoid were in excess in the United States. The highest weekly rate for pneumonia was reached on October 11 by troops in the United States: 591.5. In France, the rate for the week ended October 17 (106.7) was highest for the year. The winter prevalence reached its peak in the United States, January 18; in France, January 11. Spring epidemics of pneumonia preceded by an unusually high prevalence of the milder respiratory affections occurred among all troops both at home and in France. Meningitis was highest in the Expeditionary Force in February and and October; scarlet fever occurred in epidemic waves in January and March; dysentery reached a peak in August and remained high during the balance of the year.

The permanent statistical records for 1917, as contained in the Surgeon General's Annual Report, have been used in the further study of health conditions in the United States and France. Admissions, non-effective and death rates for all disease and for thirteen of the most important communicable diseases have been tabulated as follows:

Disease Rates for American Troops in the United States and France for 1917

	Admission		*Non-effective*		*Death*	
	U. S.	*France*	*U. S.*	*France*	*U. S.*	*France*
All disease	886.8	744.2	21.79	22.21	5.34	3.00
Bronchitis	61.75	129.83	1.12	2.25	0.01	....
Pneumonia	15.18	11.81	0.85	0.55	1.71	1.18
Pleurisy	9.43	7.64	1.7	2.2	0.02	0.04
Measles	85.15	28.83	2.63	0.76	1.70	0.39
Measles and pneumonia	3.72	0.52	0.25	0.03	1.59	0.39
Influenza	57.72	101.16	0.69	1.28	0.01	0.04
Typhoid	0.41	0.20	0.05	0.01	0.03	....
Malaria	7.46	2.43	0.15	0.05	0.01	....
Smallpox	0.26	....	0.01	....	....	....
Scarlet fever	3.52	3.66	0.22	0.17	0.09	0.18
Dysentery	0.87	0.90	0.05	0.04	0.01	0.02
Meningitis	1.74	1.45	0.11	0.08	0.54	0.42
Mumps	38.89	82.08	1.25	2.46	0.01	0.02

The general admission and death rates were higher among troops in the United States, while the non-effective rate for disease averaged slightly higher in France. In considering the low death rate in France as compared with the United States, it must be remembered that the men sent overseas were the physically select of all those mobilized in the camps at home. Furthermore, the men, in most instances, passed through the acclimatization period while training in the United States and were often seasoned soldiers before being attached to the Expeditionary Force.

Pneumonia was more prevalent among troops in the United States,

but the case fatality in France exceeded that indicated for all American troops in France and the United States combined:

	U. S.	*France*	*All troops*
Admission rate of pneumonia.....	15.18	11.81	14.59
Case fatality for pneumonia.....	.....	17.10	15.76

The admission and death rates for the following diseases were higher in France: Bronchitis, influenza, mumps, scarlet fever and dysentery.

The last two named were only slightly in excess, but bronchitis, influenza and mumps were all nearly twice as prevalent as in the Expeditionary Force. It is possible that the wave of respiratory disease, which has been one of the most notable features in the health of troops in the United States during 1918, first struck the Expeditionary Force during the preceding year. However, an excessive pneumonia rate did not exist as evidence that the virus was the same as that which caused the pandemic of the autumn of 1918. The greater prevalence of mumps in France is not easily explained. It has been thought that most men susceptible to measles and mumps were exposed and attacked during their preliminary training in the United States. A comparison of the rates of measles at home and abroad would seem to justify this conclusion, but with mumps it has not been borne out by statistical evidence.

SPUTUM-BORNE INFECTIONS ON TROOP TRANSPORTS

By Col. CHARLES LYNCH and Lieut. Col. JAMES G. CUMMING
Medical Corps, United States Army

(With one illustration)

WHEN the United States entered the war one of the big problems was that of transporting troops to France. This task fell upon the Navy and the Shipping Board. These two branches of the Government developed an organization and provided an equipment which, with the aid of ships provided by the British Ministry of Shipping, carried over 3,000,000 troops to and from France within two years. In addition to troops, enormous quantities of army supplies were transported. The magnitude of this task, it is thought, can nowhere be better appreciated than at a major port of embarkation such as Newport News, Va. In view of the magnificent showing made in transporting the great number of officers and men with their enormous supplies, criticism would be most unfair. Nor could there be any disposition to criticize on our part, for we know many of the difficulties, and our relations, at the many points of contact, with the Navy and the Shipping Board have been wholly harmonious and satisfactory from our point of view.

War on a great scale, however, almost always brings to light certain points relative to sanitation which previously have not been given due weight. We believe this to have been the case in the present war so far as sanitary messing is concerned. This applies to both the Army and the Navy. It is also always true that, even after the dangers of certain insanitary practices are appreciated, it necessarily takes some time to correct them. General education of the medical officers is necessary, in the first place, with the securing of support from the Army or Navy generally as the case may be. Then, too, it is often necessry to install new apparatus or to change that already installed. That has been the case with both Army and Navy.

In undertaking the transportation of troops to France it became necessary to secure all available ships, including not only merchant ships of the passenger type but also those formerly used as cargo carriers. The cargo spaces of both passenger and cargo ships were converted into bunk spaces with the idea of carrying human cargo to full capacity. In the conversion of these ships into purely troop carriers, the arrangements for the care, the preparation, and the serving of food were not overlooked; in fact, the arrangements on some ships were excellent, while on others it

appeared that the marine architect responsible for the conversion had but one idea—that of utilizing every available inch of space for bunks, with little thought of the food or messing problem.

Before discussing the subject of this paper, a few words more of explanation are necessary.

During the last twenty years it has been recognized that food must be protcted from contamination by the organisms of intestinal diseases. Precautions to this end have been taken, and these precautions, in conjunction with typhoid vaccination, have given the American Army and Navy a record not before equalled by a force of equal strength. From recent reports it is indicated that the total deaths from this group of infections will not exceed 200 in the American land forces of almost 4,000,000 men. Equally good results have been attained by the Navy.

While the control of the fecal-borne infections stands out as a distinct success, in marked contrast to this the so-called respiratory infections caused upwards of 40,000 deaths in the Army. This high mortality indicates that the preventive measures as applied among our land forces were of little or no avail. It is our belief that the fundamental cause of this failure lies in the generally accepted belief that the group of so-called respiratory diseases is air borne. Practically all effort to prevent these infections has been directed to the direct or air-borne avenue of transmission. Coughing and sneezing, with their supposedly droplet infection, have been accepted as the route of infection from the sick to the well. In order to combat this avenue of transmission, masks have been used almost universally, and patients on hospital wards and in sick bays have been cubicled. Notwithstanding these efforts the mortality from this group of diseases has been excessive. In fact, we fail to find reports which indicate that this method of attack has met with results worthy of scientific recognition. We believe that as long as this group of diseases are accepted as respiratory infections only, there will be little or no advance in their prevention. The designation "Respiratory Infection" is a misnomer, and to express the avenue of transmission of these diseases in the term "Droplet Infection" is an error which leads, in the main, to misdirected preventive effort. Our investigation of the epidemiology of these diseases among troops in the field, as well as laboratory research, show the error of accepting the air-borne theory of transmission as the most important avenue of distribution. From these investigations the evidence points plainly to *indirect* contact through *inanimate object contamination* as the *major avenue of spread.* The most important indirect avenue of distribution among troops is at the common mess. Here, warm mess-kit wash water serves as the common focus for the exchange of mouth organisms. Contagion is not only added to this warm water from the

hands and mess gear of unrecognized cases and convalescents, but this contagion is also taken away from the water by hands and mess gear, both of which are introduced into the mouth—with resultant infections in the case of non-immunes. So long as the water is only warm there is a continual addition and subtraction of mouth organisms. There is an incessant interchange of oral flora resulting in active cases of acute infections and in carriers of potentially dangerous organisms of the pneumonia type.

It may be laid down as a fundamental law that in large messing groups there are a few carriers who spread infection through either mess gear or tableware, and that the *large* messing groups, and the facility of transmision at the mess in the Army and in the public institutions, account for the excessive mortalities among these classes.[1]

Since the distribution of these acute infections is indirect rather than direct—for droplets fall rapidly to the floor— and since the major avenue of infection is at the common mess, and the minor avenue through contaminated inanimate objects, which we handle—while droplet in fection is only of subsidiary importance—it is believed that the designation "Sputum-Borne Infection" has greater significance than "Respiratory Infection." The former designation from the preventive viewpoint is significant, since it is the sputum-soiled hand and eating utensil which are chiefly responsible for distribution; while respiratory infection gives the erroneous idea of air-borne transmission, and this is of only minor importance.

The object of this paper is to show the influence of mess-gear washing on the acute infectious disease rate among certain overseas troops arriving at this port.

As previously indicated, the method of washing mess-gear aboard troopships varied within wide limits. On some transports excellent arrangements for mess-gear cleansing and disinfecting were provided. These consisted largely of stationary tubs which are provided with steam coils for heating the wash water. Another arrangement consisted of troughs of water, into the bottoms of which live steam enters, providing water of a boiling temperature. It has, however, been occasionally found that the trough system is unsatisfactory in that the steam may enter only at one end of the trough. At the heated end the water may be boiling, while only warm at the other end. As the soldier prefers warm mess-kit wash water so that he may be able to wash the mess-kit with his hands, the trough system, when not properly managed, does not accomplish the desired sterilization of mess gear nor prevent hand contamination.

[1] Lieut. Col. James G. Cumming, M. C.: "Influenza-Pneumonia as Influenced by Dish Washing in 370 Public Institutions." In press, *Am. Jour. Pub. Health.*

Although the equipment for mess-gear sterilization may be adequate, it should be pointed out that the personal element and continual supervision is a large factor. For example, one medical officer in charge of troops stated "that the water was kept about as warm as the men could stand it on their hands, but that it could be made to boil." In this instance the object of the equipment was temporarily defeated. In another case it was found that containers superimposed on steam baths were provided, but that these were commandeered, without the knowledge of the medical officer, for use as food warmers, while the troops used buckets of warm water for mess gear washing.

In a former report it was shown that the washing of mess-kits in tepid water was responsible for 80 per cent of the cases of influenza.[2]

Furthermore, in a subsequent report it was shown that the use of boiling water for washing mess-gear and the use of machines with boiling water for washing tableware in public eating places were essential to the prevention of influenza in camp and city.[3]

With the view of determining the influence of the temperature of mess-kit wash water as used by troops returning from overseas, transports were classified according to whether this water, as provided on each trip, was boiling or warm. Upon arrival at this port each transport was inspected and, as a result of the investigation, a classification of all troop carriers was made. This classification was determined by personal inspection and by statement of both navy and army officers aboard the ships, and consisted in dividing the ships into "A" and "B" classes. On Class "A" ships, boiling water was provided throughout the entire period of mess-kit washing. On Class "B" ships the wash water was in either stationary or improvised containers, and was of such a temperature as could be readily withstood by the hands. *The classification then was based entirely on the question of mess-gear washing in either boiling or warm water.* In this connection it is to be pointed out that a large number of ships (68) and troops (159,296) were included in the investigation, and that other minor influencing factors as crowding—all ships were crowded—air space, adequacy of food and clothing, duration of service, etc., would be equalized. There appeared to be but a single sanitary defect on Class "B" ships not found on Class "A" ships—that of insanitary mess-gear washing. In other respects there was no difference between the two classes of ships.

In the accompanying tabulation (Table II) it will be noted that 68 ships arrived during the period from February 18, 1919, to May 7,

[2] Lynch and Cumming: "The Rôle of the Hand in the Distribution of Influenza Virus and the Secondary Invaders." MILITARY SURGEON, December, 1918.

[3] Lynch and Cumming: "The Distribution of Influenza by Indirect Contact Eating Utensils." *Am. Jour. Pub. Health*, January, 1919.

1919. Among these there were 44 Class "A" ships, and 24 Class "B" ships.

Several of the ships in both classes made two trips during the period of the investigation, and while a ship might be in Class "A" on one trip it would be in Class "B" on the other trip, or vice versa. Here we find that the determining factor, as to whether a ship was in "B" Class on one trip and "A" Class on another trip, depended upon the intelligent interest and knowledge of army and naval officers in regard to the importance of sanitary mess-kit washing. The incidence of the sputum-borne diseases, including measles, pneumonia, scarlet fever, influenza, diphtheria, bronchitis, tonsillitis, and meningitis, was secured from the

TABLE I.—*Class "A" Ships*

Number troops	Measles	Influenza	Pneumonia	Scarlet fever	Diphtheria	Tonsillitis bronchitis	Meningitis	Total
97,574	3	105	23	2	6	24	2	165
Class "B" Ships								
61,722	7	198	47	4	5	29	5	295

TABLE II.—*Summary of Infectious Disease Occurrence on Returning Transports with the Classification of Ships ré the Temperature of Mess Gear Wash Water.*

	Number of ships	Number of passengers	Total infectious diseases	Cases per M.
February:				
All ships	7	14,457	89	6.2
*"A" ships	3	6,648	14	2.1
†"B" ships	4	7,809	75	9.6
March:				
All ships	21	41,675	88	2.1
"A" ships	12	21,180	35	1.6
"B" ships	9	20,495	53	2.5
April:				
All ships	13	30,929	34	1.09
"A" ships	8	15,664	16	1.02
"B" ships	5	15,265	18	1.18
May:				
All ships	27	72,245	244	3.4
"A" ships	21	54,082	95	1.7
"B" ships	6	18,153	149	8.2
Total:				
All ships	68	159,296	455	2.9
"A" ships	44	97,574	165	1.6
"B" ships	24	61,722	295	4.8

* On "A" ships water kept constantly near the boiling point was used.
† On "B" ships water of a lukewarm temperature was used.

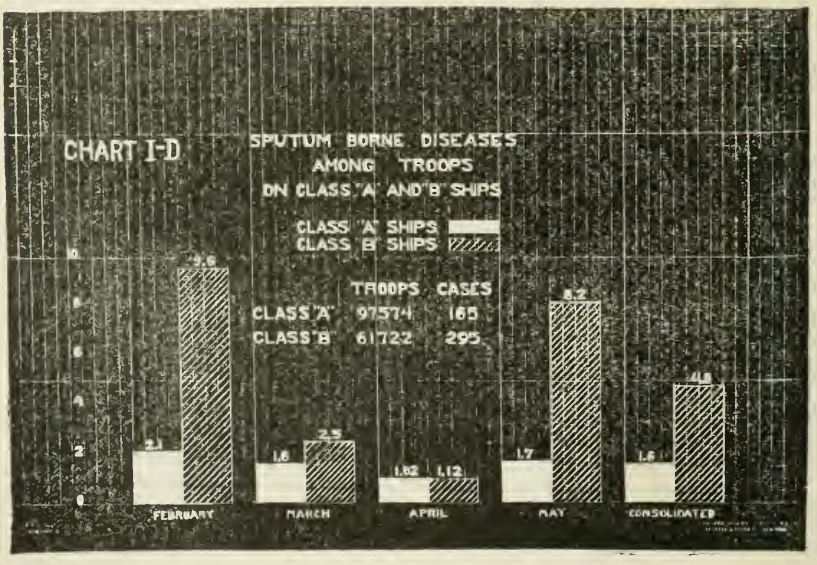
surgeon of each ship. Among the 97,574 arrivals on Class "A" ships there occurred 165 cases of sputum-borne infections, while among 61,722 troops on Class "B" ships there occurred 295 cases.

In Table I there is presented the number of cases of each infection arising on the two classes of ships. It will be noted that for the period of this investigation 40 per cent of the troops were carried on Class "B" ships, and that among these there occurred 75 per cent of the total cases.

In Table II there is shown the number of ships in the two classes, the number of troops, the total infectious diseases, and the case rates per 1,000 for each of the four-months period. From these data there is presented in Chart I-D the monthly and consolidated rates on the two classes of ships.

For the 97,574 troops arriving on 44 Class "A" ships the sputum-borne disease rate was 1.6 per 1,000 troops, while for 61,722 troops arriving on 24 Class "B" ships, the rate was 4.8 per 1,000. It is worthy of note that of the total 455 cases only 33 per cent occurred on Class "A" ships; or, in other words, on ships where boiling water was not provided for washing mess-gear, the rate of infection was three times greater than on those ships where the main avenue of distribution was blocked by the use of boiling water.

These findings verify our former reports on the influence of sanitary mess-gear washing on the incidence of the sputum-borne infections, and emphasize the importance of providing boiling water for mess-gear washing for troops and sailors.



ABSTRACT OF REPORT OF PROFESSOR RUBNER MADE IN THE REICHGESUNTHEITSRAT, DEC. 20, 1917

(Concluded)

IN THE following pages we shall seek to give as impersonal a presentation as possible of the present health conditions of the nation, in so far as these may be regarded as dependent upon the altered food conditions.

In order to determine as exactly as possible the present conditions, the Imperial Health Bureau sent to the states of the Bund, Prussia excepted, as just such an investigation had already been carried on here, the following questionaire:

1. Are indications present that the health condition of the civilian population has been unfavorably influenced by the altered living conditions resulting from the war?

2. What is the nature of these indications?

Were they, for example, such phenomena as surprising loss of weight, extraordinary increase or decrease of contagious or other diseases as typhoid, dysentery, diphtheria, tuberculosis, venereal diseases, appendicitis, neurasthenia, skin diseases or other peculiar diseases, as for example, edema?

Did these indications consist of an increase of mortality in definite forms of illness or in a retardation of the process of recovery?

3. Have the injurious effects of the war appeared to any special extent among definite groups (for example, infants, school children, elderly persons above the age of fifty, pregnant women, manual laborers, mental workers, middle class, poor people), and, if so, in what direction have these results shown themselves?

4. How far are the changes observed in the health conditions attributable to the present food conditions? Can injurious effects arising from the composition or quantity of the bread, the eating of "Steckruben," decrease in allowance of meat, milk, or fat be proved to exist?

5. Have thorough and adequate experiments been made in institutions under government control, such as seminaries, prisons, insane asylums, infirmaries, etc.?

6. Did the phenomena mentioned under pars. 1 to 5 first occur to an important extent in that portion of the year 1917 and extending to the present time, or how far had they already shown themselves in the pre-

ceding war years, 1914, 1915, 1916; or how far, in such phenomena as loss of weight, either a rally or a halt taken place recently?

These questions were answered by the medical authorities or by the communal representatives after consultation with physicians or other medical officials.

From the observations made in Prussia the following conclusions have been arrived at:

There is no general condition of famine, but there is famine to a greater or less extent in many large cities and towns with an industrial population. No exact idea of the amount of food procurable by the individual, legally or illegally, can be obtained owing to the complicated social conditions. The uniform ration is, however, insufficient. If all other nourishment is excluded, it will not suffice to maintain permanently the life of an adult. The unfavorable influence of the decreased diet is, for the most part, in the case of persons with callings demanding a moderate expenditure of muscle energy, balanced by a decrease in the work done. The same thing happens in the case of half-grown persons and children, who normally always have an assimilation affected by vigorous muscular activity, because of the limitation of this activity, decrease of vigor, and disinclination for play and sport. Somatic changes are for the most part shown most quickly in the case of persons of a sedentary mode of life, since here the possibility of limiting muscular activity is very slight. In the case of women these effects are shown later, in so far as they are not so heavy and, on the average, fatter than men. The quality of the diet, its digestibility, its impalatability, produce injurious effects according to the social position of the individual and the habits of life arising therefrom. In the case of old people also changes in the quality of the diet, because of greater losses of protein than appear in a diet inadequate merely through its meagerness, produce unfavorable effects.

The newly born come into the world unaffected by the food conditions. In the case of infants neither any injury nor any harm of any sort can be observed. Small children are on the average slightly thinner. In the case of sickly children and those with a poor constitution there often appears to be a retardation of convalescence and a transition from tendencies to illness to really disease conditions. In general the same thing holds true for children of school age as for little children. The unfavorable influences are, however, somewhat more sharply defined. Persons from 15 to 20 years of age are about in the same category with children of school age. The sickly and those with poor constitutions suffer so greatly from the war diet that mortality in many places has been affected.

Healthy adults of from 20 to 60 years of age living under conditions of free social intercourse are in general thinner, but no less efficient than formerly. Exception must be made of a large part of the officials and those with fixed salaries, persons with small annuities, a part of the lower bourgeoisie, those who are not able to do a full day's labor but have to work more or less, and mental workers. In the cases of these, conditions of physical weakness and decreased efficiency more often appear.

Another exception is edema arising from an insufficient diet. In the case of the sickly who live under free social intercourse and those with poor constitutions, between the ages of 20 and 60 years, such sickness as tuberculosis, diseases of the respiratory and circulatory organs, pneumonia, intestinal troubles, and nervous diseases are more frequently fatal than formerly. The mortality of persons over 50 years of age has increased to an important extent. This is either the result of the insufficient diet or of the increased number of diseases caused by the diet or of the diminished power of resistance when disease has once broken out.

Adults living in institutions under close control, sometimes also the youths in the provincial educational institutions, suffer very severely, the healthy as well as the sickly and sick. Edema and death, in the case of other diseases that are not specific, are very often the result of the war diet.

Tuberculosis mortality has increased greatly. Fresh cases of this disease are likewise increasing to a significant extent. This is true for all classes, with the exception of infants, though small children do seem to present this phenomena to the same extent as the other groups.

The reports from the other sections of the empire complete this picture both as regards the favorable and the unfavorable features. As every journey shows, the food difficulties are not purely local phenomena.

It would be difficult to divide the cities and districts into definite groups and classes according to their lack of food. The greater the lack of food in the empire in general, the larger the number of places threatened and the more sharply are the results defined in the districts already affected. This is easily comprehensible, since the food regions about a city determine the extra supplies which are at the city's disposal to piece out the government ration. If we study the reports as a whole, we notice, in the circles that are suffering little from a food scarcity, that the persons making the report are still doubtful as to whether this or that surprising phenomenon belongs to the category of injuries due to the diet. But where the food scarcity has really begun, the judgments show a decided agreement. Cases of the latter sort furnish the

standard for an understanding of the matter; through them we find also the thread connecting with the first years of the war and the beginning of the present conditions, and with the symptomatic prodromal phenomena.

In perfect agreement with the Prussian experiments it is shown that there is no question of a general imminent danger to health in all cities; and, further, the food shortage, especially in many large cities and above all in industrial centers, has reached a very considerable degree. Inasmuch as the general food system is regulated by the central government, this shortage is caused both by lack of foods that may be obtained with food tickets and by the meagerness of other supplies from the rural districts; it is certain that people in the country, if we disregard the occasional reports that women have been injured by overexerting themselves in performing hard labor, have not suffered from an insufficient food supply, but the same thing is true of many small cities, which, because of their particular location in relation to rural districts, have been abundantly provided with supplies to piece out the general ration, or, in some way or other, self-providers as regards some sort of food. Complaints are, however, growing numerous, and the health situation is getting serious, especially where populous cities lie within a rather unproductive rural district. Such is the case with Berlin and several other large cities. From the rationed foods the people cannot obtain sufficient nourishment, and the supply of other kinds of food to be procured legally or illegally is very scanty.

Individual states of the Bund have, apart from certain inequalities in some provinces, a general type of more or less adequate food supply. To take a few examples, the conditions in Wurtemburg, northern Baden, Alsace, some sections of Thuringia, Waldeck-Schwerin, Oldenburg, parts of Brunswick and Mecklenburg are locally very favorable. Saxony, on the other hand, of all the states of the Bund, is in the worst situation. There, too, conditions often vary greatly in districts not far removed from one another. In Saxony the supply of the rationed food seems not to have been assured at all times. Among other things the meat supply was very scanty, and the use of "Steckruben" as a substitute for potatoes, or even for increasing the production of bread, appears to have become very extensive, as it is more often mentioned there than in reports from other places.

As a further result one may note the fact that there is general agreement that during the first two years of the war no real injury of a serious nature could be observed in that part of the population who lived under no restraint, even though certain slight disorders, which later appeared in more distinct form, did appear as forerunners of more serious dis-

turbances. The beginning of these serious consequences is commonly considered to be the summer of 1916 or from October, 1916, on. The milk supply has had an especially unfavorable effect upon conditions, although on this point it would have been possible to have secured larger deliveries. From the nature of the case, essential changes in the health of the nation do not occur simultaneously with the issuing of the new decrees, but, like the decrease in weight and the accompanying phenomena dependent upon this, will not be noticed until after the lapse of a certain time. In individual instances this may be quite exactly observed. Moreover, the effects of the decrease in the food supply is confused with the inevitable consequences of the uneven distribution, which already has been discussed along with other general considerations.

A number of phenomena can be explained, without further investigation, by the anatomical changes that result from a loss of fat. With the disappearance of the fat comes an extension of the inguinal canal and a diminution in the mass of the intestinal coils. Accordingly there is reported an increase in the necessity of operations for hernia. Intestinal obstruction occurs more frequently. Deterioration of the female sex organs is reported. There appears to be an increase in the number of cases of appendicitis. A phenomenon, which is tremendously widespread, and apparently appears wherever the war diet is closely followed, is the increase in the voiding of urine during the night. Because of this the nightly rest of many persons is disturbed or even insomnia arises. Bed wetting is increased very much among children and in numberless cases is reported of adults also. This is certainly to be regarded as alimentary polyuria, and has already been stated and explained.

With the deterioration in the condition of the cells is associated the poor blood supply. Complaints concerning anemia are universal. Along with the laying off of the cell content in general there is evidently a lack of material for the reconstruction of cells in the service of forming blood or any further cell reconstruction or regeneration, or for the formation of secretions and other things of a similar nature.

An unwelcome phenomenon, which is increasing from month to month, is the retardation of menstruation in the case of women and girls of all classes. The more unfavorable the food conditions, the more prominent are the data in the reports concerning this matter. Even in the case of inmates of institutions under governmental control this fact is everywhere emphasized. Obviously many of the persons making the reports have not mentioned this disturbance in menstruation, because it has so happened that no complaints have come to their attention. So widespread a phenomena of this nature in a period of enormous decrease in

the birth rate leads one to assume a connection between the two circumstances or to suspect this to be one of the causes that has worked toward a diminution of the birth rate. In all probability its cause is to be found in the great lack of protein in the diet, because of which the normal restoration of the blood cells is diminished, and because of a lack of blood the normal bleeding that takes place during menstruation does not occur and a favorable factor in the process of fertilization is thereby lost. It is also a question whether the formation of the egg itself is normal and whether the egg possesses all normal qualities necessary for development.

Of the sexual organs of the male, the reports naturally contain very little. Before any such reports can be made a thorough investigation is necessary, but now and then mention is made of a decrease in the libido sexualis. This might be connected with the extreme atrophy of the testicles which has been noted on the bodies of the poorly fed persons on the eastern front. Spermatogenesis is also much diminished.

An increase in skin diseases, even those of communicable nature, among both children and adults, is noted on all sides by the men who make the reports. Although there are many indications that the skin itself suffers from poor nourishment, there is no way of determining what portion of the skin diseases is due to lack of cleanliness necessitated by the lack of soap. Because of the further restrictions upon the coal supply and limitation of bathing facilities a further increase in these diseases will probably take place. The frequent occurrence of furuncle, reported from various sources, arises from the want of clean linen, the lack of cleanliness, and also from the diminished powers of resistance in the tissues. The itch and maw-worms are also quite widespread, a fact which is attributable to the altered conditions as regards cleanliness.

There has of late been considerable talk about heart trouble arising from the loss of flesh, but the reports do not give any definite data regarding this question.

There is nothing to confirm the idea that the venereal diseases are of frequent occurrence. The same is true of typhoid fever, diphtheria, and many other infectious diseases, except dysentery and tuberculosis.

No increase of insanity can be proved to exist, even though neurasthenia and the like have increased, as might well be expected from the very nature of conditions in war-time. Eclampsia has decreased; epilepsy has increased.

Concerning the increase of tuberculosis, all authorities are in perfect accord. As an important cause of this the revivifying of old foci under the influence of poor diet is cited, or severe and more rapid course in the disease itself is reported. Tuberculosis in its incipient stages is mentioned

as being found incidentally in post-mortem examinations. For children, the danger of tuberculosis has increased.

In numerous cases a more rapid unfavorable course of the disease is reported as regards cancer; it seems to be chiefly a question of lack of food suitable to restore the patient. Mention is also made by many good authorities of the frequency of cases of cancer.

With great optimism one regarded, during the early years of the war, the relation of the altered diet to the stomach and the intestinal canal. In the daily press and in the medical press many physicians seemed unable to do enough talking about the blessings of the war diet, because on account of it all stomach and intestinal diseases arising from over luxurious diet, etc., had disappeared from the face of the earth. Quite different were the reports concerning the past winter and the summer of 1917. The war diet is considered to be the cause of the numerous cases of stomach and intestinal catarrh, which at various times have affected almost all the inhabitants of many cities. The fact is emphasized that the urban population, more than the rural, suffer from these troubles.

Sometimes the disease is called cholerine; sometimes it is complicated by fever, attacks the small and large intestines and is similar to dysentery. In many towns numerous deaths have occurred. Since cases of real dysentery have occurred and no exact investigation of the individual cases was possible, no sharp distinction can be made. To regard all cases in general as dysentery is not to be thought of. The term often used, "similar to dysentery," only means that no real dysentery was present. The cases were accompanied by a general condition of weakness. It seems an important fact that the cases were first observed in those sections where the food conditions were very unfavorable, as in Saxony, and that they were then tremendously widespread. Convalescence was very slow, as there was scarcely any possibility of procuring any improvement in the diet. As one report states, the sick and the convalescent were always obliged to expose themselves anew to the old injurious conditions. The disease was also very widespread in the institutions under governmental control, in which, with few exceptions, the food supply left much to be desired.

Concerning the cause of these stomach and intestinal troubles, mention is made in most reports of the deterioration of the diet, and from many sides comes the hint that this may have played a part in determining the course of the disease. Through the weakening of the body it was no longer possible, they say, to stand the poor diet. An examination of gastric juices in two towns situated far apart proved that there was a lack of free hydrochloric acid.

If we disregard the condition of the half-grown, concerning which we

have no exact data, and consider adults according to their position and calling in life, it is shown that the working classes are at least relatively better cared for than other persons. As between man and woman, the man is usually at a disadvantage, as is easily understood and has already been mentioned from the claims a man has upon nourishment and the nature of the rationing system.

The laboring classes enjoy the advantage that in the cities employes and employers meet to discuss the extra ration, as a result of which their bread supply, etc., is increased as a general thing, and the worker is placed in a more advantageous position than the other classes. Sometimes this affects the mechanic's trade in a very uneven manner: the master does not get extra rations, but the apprentices do. Persons who are not members of the Sick Benefit Fund are also less favored than others as regards rations. From the reports it is plain to be seen how much more the middle classes have to suffer than do others; for example, the laboring classes, who for the most part receive in national kitchens, as war workers, through canteens, etc., quite a quantity of extra supplies that are inaccessible to others. Only the remnant of these supplies that are not needed for the war industries, for welfare institutions, such as national kitchens and canteens, can be procured from the open market. Academic professions and mental workers obviously come out at the small end as regards the food supply; for this category the uniform ration must suffice.

The heating question is directly connected with the food question, and this can be said also in the matter of clothing as a means of procuring warmth for the body. A lack of warmth brings about a considerable increase in the amount of food required. Inasmuch as the supply on hand to meet this demand has in the course of this paper been shown to be permanently below the requirements, and in part dangerously so, the poor coal supply further heightens the danger to health and causes an increase in mortality. The heating question is therefore not a matter of procuring merely the comforts of life, but one that must be absolutely considered if we are to hold out. The need of heating is increased at present. Insufficient blood-building comes from insufficient nourishment, and on account of this lack of new blood the sensation of cold arises, a sensation that tortures the poorly nourished in a temperature that does not affect the well nourished at all. In respect to the spread of tuberculosis and the heightening of its symptoms, any increase in colds and catarrh as a result of lack of heating is of great importance. Elderly persons, in general, suffer more from the effects of cold than do younger persons.

As concerns the coal supply, very varied effects are produced in vari-

ous households, the most unfavorable in the large residences, as results naturally if we consider the amount of fuel necessary for maintaining a sufficient degree of warmth. The allowance is scarcely sufficient for a few rooms, leaving the other rooms, which must be used when the inmates pass from one part of the house to another, in a very cold state, which creates the most favorable conditions for catching colds. To enter into greater detail on this question would carry us beyond the scope of the matters under consideration.

The ills and dangers threatening that part of our nation living in the cities has been clearly enough described in the reports; the results of the Prussian investigations, too, are confirmed by statistical evidence. In the cities that were carefully investigated there was found to be greater mortality, increasing with age; for those above fifty the mortality has increased especially since the spring of 1917. Since epidemics, which might disturb our totals, do not enter into this consideration and the increase of tuberculosis is to be included in our study of the effects of the food conditions, we are justified in claiming that the increase in mortality, which in Berlin, for example, is considerable, is to be regarded as a reaction of the inadequate food supply upon mortality.

General improvement in the food conditions in many cities is a question of such great importance for the government that all measures must be taken to alter thoroughly the conditions that have thus far prevailed in those places that are suffering from famine. Our future national energy is at stake.

OBSERVATIONS ON 500 CASES OF SCARLET FEVER[1]

By Major JOHN B. LUDY, Captain ERNEST L. HUNT, and Captain LLOYD H. COGSWELL

Medical Corps, United States Army

(With two illustrations)

DURING the influenza epidemic at this camp, several cases of suspected scarlet fever were admitted. It was noted that they were of the septic type, but, during the confusion following the admission of so many more patients than the hospital normally accommodated, they were discharged after convalescence was established without full observation having been made on them and adequate quarantine enforced.

During the early part of November, 1918, twenty six men arrived at this camp. Inspection revealed that six of this number were in a desquamative stage of scarlet fever.

It is believed that a predisposition for scarlet fever is engendered by the presence of any form of catarrh, especially if localized in the fauces. The influenza epidemic just closing afforded an excellent opportunity for the engrafting of the causative factor of scarlet fever.

In the months that followed, there were 500 cases of scarlet fever admitted to the hospital. Of this number, there were several toxic cases with fatal issue, eight septic cases with fatal issue, bronchopneumonia playing the final rôle. The remaining cases were, for the most part, of simple scarlet fever. A constancy of type (the simple variety) characterized the epidemic.

Our receiving ward records show that 2 per cent of our admissions for scarlet fever were in the desquamative stage on admission. The subjective symptoms were insufficient to make a report on sick call necessary during the period of their infectivity, and the objective symptoms were apparently insufficient to attract attention, or the type was "*Sine Eruptione.*"

Nausea, vomiting, and sore throat were the initial symptoms in 15 per cent of the causes; 75 per cent had sore throat and headache; 10 per cent were admitted because of eruption; eight cases had urticaria as the initial symptom.

A general adenopathy was the rule. Submaxillary and bilatereal inguinal lymphadenitis was noted in 100 per cent of the cases. The adenopathy began to manifest itself after the first twenty-four hours. The inguinal glands would be soft, markedly palpable and tender, the

[1] Camp Hancock, Augusta, Georgia, November and December, 1918; January and February, 1919.

tenderness in some instances amounting to pain. These symptoms would continue for four or five days, after which subsidence to normal was the rule.

The glands were movable, could be slipped between the thumb and forefinger, were sensitive and felt soft and elastic. Some were dissected out and others were obtained at autopsy, and all showed an acute inflammatory process characterized by congestion of capillaries, slight diapedesis of red cells and especially by the presence in the sinuses of plasma cells and endothelial leucocytes, many of which latter were phagocytic to red blood corpuscles and other leucocytes. Dr. Lamar called attention to the absence of follicular hyperplasia and the general likeness of the process to the lymphadenitis occurring in typhoid. There was no tendency to suppuration.

The cheeks were from the very first day suffused with a vivid flush. This condition would last from one to several days, after which a fine, powdery desquamation would ensue, the first sign of peeling. Circumoral pallor was characteristic and seemed of value in distinguishing it from the other eruptive fevers.

The eruption in a good many cases was very evanescent, disappearing often in a few hours and attracting little or no attention. That the eruption was evanescent and unnoticed by the patient and his tentmates is proven by the fact that 2 per cent of admissions were during the period of desquamation, the patients not remembering ever having had an eruption of any kind and not aware of any contagion until their curiosity was aroused by appearance of the desquamation. The rash, punctate in character, usually appeared after the first twenty-four hours. The location was on the upper chest, neck, and upper arm, and often in another day would cover the trunk and lower extremities. The axillary region, the groin, and the bend of the elbows, showed the rash in the most characteristic form and persisted in these localities the longest. In some instances, a secondary rash—erythema simplex—was superadded, which was, however, of a transient character and would disappear before the puntate eruption. Slight pressure with a glass slide would cause the erythema to disappear, and the fine papular or punctate rash would alone remain. The erythema would be more or less generally distributed involving the cheeks, neck and body generally. The palms and soles were free of any eruption. The cheeks were always free of punctate eruptions. The secondary erythema, as described, was present in over 60 per cent of the cases.

A folliculitis was observed in 9 per cent of the cases that had a pronounced rash. This was observed during the second week and was noted on outer surfaces of arms and legs.

The mucous membrane of the fauces, the palate, and the uvula were deeply injected in the septic cases, attended usually with an inflammatory edema. In the mild throat these symptoms were correspondingly less. Punctate eruption present on the palate (hard and soft) would vary in its intensity with the type of the disease. The throats of the scarlet fever patients were more diffusely congested than is observed in ordinary tonsillitis.

In the more pronounced cases, the tongue, during the first day, rapidly coated, with a thick, white fur, as a result of the active proliferation of the normal epithelium. On the second day a denudation of the epithelium occurred which, by the end of the third day, was usually completed, giving a red appearance. This denudation usually began at the tip and edges and rapidly enveloped the entire tongue. The fungiform papillae were usually observed appearing through the white coating. After the third day, with the tongue denuded of its normal epithelium, the classic "ripe strawberry" tongue would appear. Be it noted that the completeness with which the tongue peeled was directly proportionate to the degree of inflammatory injection of the faucial and buccal mucosa, and that in cases of mild scarlet fever one found an atypical strawberry tongue. After from seven to ten days the epithelium of the tongue began to restore itself. Seventy-two per cent of the cases showed some degree of strawberry tongue.

After the first week, peeling began on the neck, chest, and inner surface of the arms. After a second week, peeling was general. After four weeks peeling was usually complete, with the possible exception of the hands and feet. The amount of desquamation was usually proportionate to the intensity of the eruption; consequently the milder the eruption, the less the desquamation. In one series of ninety-nine cases which showed desquamation, thirty-five did not have any eruption during their period of hospitalization, and no history of their having had any eruption was obtained. Many of the other cases that did desquamate had a very evanescent eruption and the possibility of the above thirty-five having had an eruption of few hours' duration should be considered. There was no case that developed scarlet fever intramurally with subsequent desquamation, that did not have some eruption, however slight. The history of one case showed desquamation starting at the usual time and completed in four weeks, which, shortly after discharge from the hospital, began to re-desquamate on his hands and feet.

A moderate hyperleucocytosis existed until after the disappearance of the eruption, when it began to subside, and by the end of the third week the count was usually normal. An absolute and relative increase of polymorphonuclear newtrophiles was present during the period of

hyperleucocytosis. Eosinophilia was a diagnostic phenomena. This usually began the third day of the disease and increased during the succeeding four or five days after which the percentage decreased, although continuing until long after convalescence. Tonsillitis and other septic conditions can be differentiated by the absence of this cosinophile increase.

Eosinophilia shown by our cases as follows: 36 per cent showed over 5 per cent, 10 per cent showed over 4 per cent; 11 per cent showed over 3 per cent; 43 per cent showed between 2 and 3 per cent.

Leucocytosis shown by our cases as follows: 40 per cent showed between 7,000 and 10,000; 12 per cent showed between 10,000 and 12,000; 19 per cent showed over 12,000.

It was noticed that the type of the disease, the intensity of the eruption, and the degree of desquamation bore a direct relationship to the blood findings. The more marked the prodromes, the greater the leucocytosis; the less the eosinophilia, the less was the desquamation. The laboratory made differential blood counts on one hundred healthy individuals and reported an average eosinophilia count of 0.35.

The average temperature was 101.5, the highest being 104.6. Some of the mild cases had a temperature of a day's duration, and this less than 100.

The average pulse rate was 110. The highest pulse rate recorded was 152.

Urine.—In ninety-two cases, the urinary findings were as follows: 1 per cent had albumin only; 2 per cent had hyaline casts only; 28 per cent had both casts and albumin in quantity; 61 per cent were negative.

In thirty-four cases in which bi-weekly urinary examinations were made, the report shows the following:

First week: Albumin, 67.3 per cent.; casts, 35.3 per cent; albumin and casts, 35.3 per cent.

Second week: Albumin, 58.8 per cent; casts, 14.4 per cent; albumin and casts, 14.4 per cent.

At the end of six weeks: Albumin, 8.8 per cent; casts, 2.9 per cent; albumin and casts, 2.9 per cent.

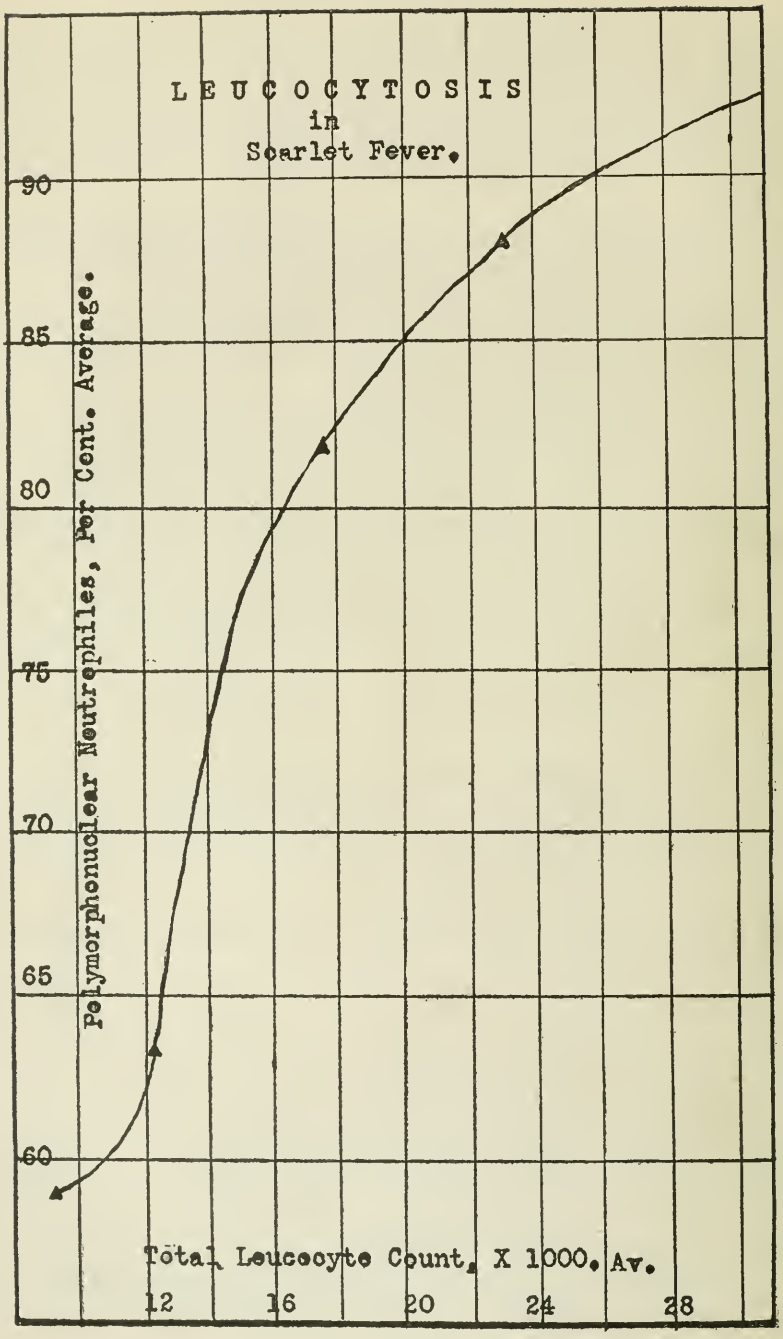
Complication: Otitis media, supperative, acute, 11 per cent; bronchopneumonia, 6.5 per cent; arthritis, 5.9 per cent; mastoiditis, 2.9 per cent; relapses, 3 cases; jaundice, 3 cases; diphtheria, 1 case.

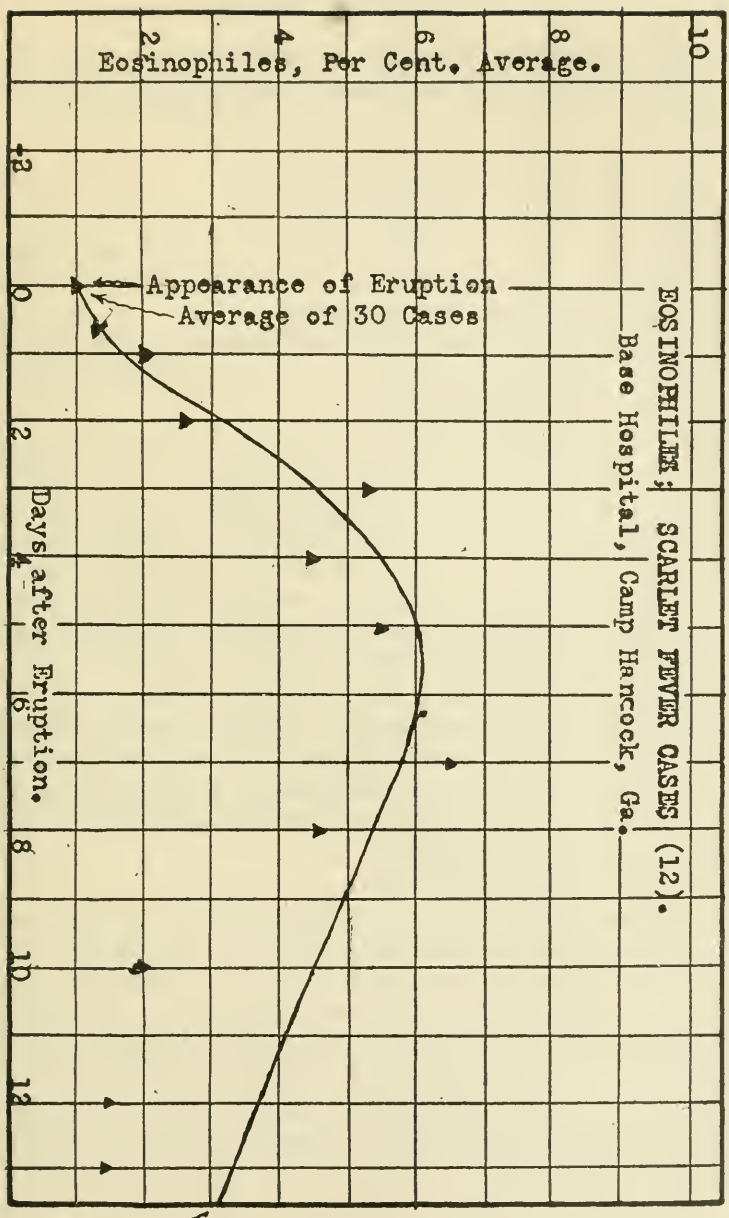
In one of our wards with 70 patients, 25.7 per cent gave a history of having had influenza since October, 1918.

5.7 per cent gave a history of previously having had scarlet fever.

36.2 per cent had positive streptococci in the throat.

44.3 per cent had a temperature of over 100.


LEUCOCYTOSIS
in
Scarlet Fever.
90
85
80
75
70
65
60
Polymorphonuclear Neutrophiles, Per Cent. Average.
Total Leucocyte Count, X 1000. Av.
12
16
20
24
28



30 Cases Av. 2.4 % when Desquamation is complete (4-6 weeks).

55.7 per cent had a temperature of less than 100.

100 per cent had more or less general lymphadenitis; all had inguinal adenitis.

92.8 per cent had strawberry tongue.

35 per cent were admitted with eruption.

65 per cent had rash before admission.

92.9 per cent had appreciable eruption on hard and soft palate associated with more or less injection of the fauces.

70 per cent had marked desquamation.

Location of eruption: Neck, chest and abdomen, 40 per cent; entire body, 26.5 per cent; chest and neck, 17.6 per cent; chest and back, 5.9 per cent; chest and arms, 5.9 per cent.

Of the milder types of the disease 48 per cent were from the north and west, while 52 per cent were from the south.

Of the cases with all usual symptoms markedly present, 99.2 per cent were from the north and west, while 11.8 per cent were from the south.

In several of the cases the desquamative period was delayed; in these instances the desquamation was preceded by a dusky erythema not unlike that preceding a dermatitis exfoliativa. The desquamation was simultaneous and universal in these cases. It was also noted that the white blood count of these cases at time of eruption was 5,000 or less, and at the time of desquamation 10,000 with marked eosinophilia.

The cases of relapse occurred during the second and fourth weeks, after convalescence seemed well established. Repetition of all symptoms occurred, except that the mild cases were more severe and the previously severe type more mild.

The mortality rate was 2.5 per cent.

Autopsy on these scarlet fever cases showed marked enlargement of the mesenteric and retro-peritoneal glands and of the spleen.

Summary—In this series of cases the constancy of bilateral inguinal adenitis in the early days of the disease was striking, and when occurring with any one of the cardinal symptoms such as angina, strawberry tongue, erythema, punctate rash of the distributions described, fever with hyperleucocytosis or eosinophilia, may be considered as of decided diagnostic importance, and under epidemic conditions, as justifying a diagnosis of scarlet fever.

Furthermore, it seems probable that "*Scarletina Sine Eruptione*" does occur, and under epidemic conditions certain cases may be diagnosed and quarantined as having the potentialities of carriers.

Our thanks are due to Dr. R. V. Lamar, Professor of Pathology at the University of Georgia Medical School, for pathological work, and for valuable suggestions and advise.

DIPHTHERIA IN THE AMERICAN EXPEDITIONARY FORCE

By Major MARCUS P. NEAL and Captain ALAN C. SUTTON
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INTRODUCTION

FOR a disease with such simple and ideal therapeutics and with methods, laboratory, etc., which on the face of them would seem to offer an almost exact means of control, diphtheria caused a large amount of incapacity among certain troops in the A. E. F. and was continually one of the chief sources of worry to those responsible for the control of infectious diseases. The largest single factor affecting the prevalence of diphtheria in the A. E. F. was the overcrowding in sleeping quarters, especially on the transports, a matter unavoidable in the military emergency which existed. This, however, is no reason for lightly laying aside the burden of responsibility. An endeavor, is here made to give a careful résumé of the more important outbreaks of diphtheria, including both, the manner of spread and the steps taken to bring them under control. Each of the methods of control now generally in use is passed in review, and in the light of our experience an estimate is given on both their value and their shortcomings. Finally, conclusions are formulated as the basis of a series of recommendations covering the steps to be followed in controlling a diphtheria outbreak among troops under the various conditions that one encounters.

Diphtheria ranked fourth among the infectious diseases as causes of days lost in hospital the first three being mumps, measles, and scarlet fever.

Prior to our active participation in the fighting—during the year ending May 31, 1918—there were 34,892 cases of the following diseases, a group largely influenced by overcrowding: Pneumonia, meningitis, measles, mumps, diphtheria, influenza.

During this period this group comprised one-third of all cases due neither to injury nor wounds received in action.

In March, 1918, during the week ending March 17, the incidence rate of diphtheria per 100,000 was higher than recorded at any time in the allied armies after January 1, 1915, in the B. E. F. This was almost entirely due to the epidemic in the 32d Division.

The following table giving the number of cases of diphtheria per month and the rate per hundred thousand is taken from Col. Haven Emerson's report in Part I, Chapters I and II, on "The Prevalence of Communicable Diseases in the A. E. F." Reference should be made to

that chapter for charts, general statistical details, and comparisons with the other allied armies.

Months	1917		1918		1919	
	Total number of cases	Rate per 100,000	Total number of cases	Rate per 100,000	Total number of cases	Rate per 100,000
January	.....	.....	17	9.0	382	21.1
February	.....	.....	46	20.1	378	22.7
March	.....	.....	266	92.9	331	22.1
April	.....	.....	232	53.1	195	16.3
May	.....	.....	329	65.4	161	14.6
June	.....	.....	332	45.0	.....	.....
July	13	83.6	251	25.4	.....	.....
August	10	37.5	364	33.8	.....	.....
September	18	40.3	312	20.6	.....	.....
October	8	11.4	341	19.6	.....	.....
November	5	4.7	388	26.3	.....	.....
December	18	12.7	478	25.0	.....	.....

There were 62 deaths due to diphtheria prior to June 1, 1919, which is a case mortality of 1.3 per cent.

With a combat army where the medical problem is to keep the soldier at the front, in fighting trim, and under conditions where not a single man could be spared, the continual presence of a large amount of endemic diphtheria with several epidemics, and always having a higher rate than either the British or French armies, gave one the continuous sensation of sitting on a threatening volcano, which might suddenly become more dangerous and, by even temporarily incapacitating a much larger number of troops, become a serious factor in the efficiency of our Army.

General Features of Diphtheria in the A. E. F.

The presence of diphtheria in the A. E. F. and the problems encountered in the efforts made to control this disease can be divided advantageously into four periods for purposes of description and study.

(1) The 1917 period. During this time the rate per 100,000 averaged 31.7, which was only surpassed during the four months that marked the height of the epidemics of the next period. There never were, however, more than 18 cases at any one time during this first period, this being the maximum number for any month prior to February, 1918. This period was prior to any real laboratory organization in the A. E. F. The control was handled almost entirely by the local medical officers in each case.

(2) The period covering the first six months of 1918, when troops were brought overseas in large numbers on crowded transports and then placed in training areas or quiet sectors of the line. During this period the problem was chiefly in the divisions. The 32d and 35th Divisions were the worst affected. The control at this time was handled almost entirely by the Central Office Personnel[1] and is characterized by the introduction of two things: (*a*) the use of extensive field laboratory work in the search for carriers, and (*b*) the protection of all susceptible individuals, as determined by the Schick test.

(3) The period of active operations extending from the troop concentration prior to the St. Mihiel offensive to the signing of the armistice. During this period all the divisions, including those in which diphtheria cases were still occurring in fair numbers, had to give practically undivided attention to the problems of active combat, the care and evacuation of the wounded occupying 90 per cent of their thought. Time was not taken for careful bacteriological examination in cases of sore throat even clinically suspicious of diphtheria. Suspected cases could no longer be hospitalized in the division area. All sick unable to do full duty were evacuated, their places being filled by fresh replacements. As a result, diphtheria ceased to be a divisional problem, but became concentrated in the hospital centers in the interior to which these men, evacuated from the divisions, were sent. In addition to the rapid evacuation of all sick, most of the divisions had left their laboratories behind owing to the shortage in transportation, so that, as a rule, no throat cultures could have been taken even if time and personnel had been available during lulls in the fighting. The control work during this period was done by hospital center laboratories "playing on their home-grounds," the Central Office acting only in an advisory capacity when necessary. The chief handicap was an overcrowded hospital and an overworked personnel.

(4) The period of occupation, following the organization of the 3d Army. Here the question of exposure to civilian cases became an important factor. The methods of control, especially during the early months of the Army of Occupation, were similar in many respects to those of the first period. Reliance was placed on early isolation of suspicious cases accompanied by careful quarantine measures. Little or no systematic search for carriers was made. They were dependent chiefly upon the main laboratory at Coblentz, which was not completely established until several months after the organization of the 3rd Army.

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[1] "Central Office" as used hereinafter means the Office of the Director of Laboratories and Infectious Diseases, Chief Surgeon's Office, A. E. F.

Historical Description of Diphtheria in the A. E. F.

During the *First Period* (the period of 1917) the incidence of diphtheria per 100,000 was high, although the actual number of cases was never large. At this time there were only the few base hospital laboratories where their own patients were cultured and the U. S. Army Laboratory at Neufchateau where throat cultures taken among troops in the Zone of the Advance could be sent. This of course rendered the consideration of extensive laboratory examination of all contacts out of the question as an available means of control. In consequence, among the troops entire dependence had to be placed upon the early diagnosis of cases, with the isolation of each suspicious case until the diagnosis could be cleared up, and the rigid enforcement of quarantine measures upon all contacts. This proved satisfactory in preventing a serious epidemic at this time. In weighing this result with those obtained later, when, in addition, extensive laboratory investigations were used, one must not lose sight of the fact that there was not yet the factor of serious overcrowding. The troops were more stationary, and their duties were such, since we were not yet relied upon to hold an actual front line sector, that time could be taken to carry out to the letter all quarantine measures.

In the *Second Period* we see the first serious introduction of diphtheria into the A. E. F. It was brought over especially by two divisions, the 32d and the 35th. Already existent in these divisions while in cantonments in the States, the smouldering fire was fanned into a blaze by the enforced overcrowding on the transports and for a time after arrival in the divisional areas in France. Fortunately, out of a total of 42 divisions in France, only these two were seriously involved with this disease.

Among the earliest outbreaks of diphtheria that came under the supervision of the Central Office after its establishment, February 1, 1918, was a small epidemic at the 1st Corps School located at Gondrecourt in the 1st Division area. The cases were cared for at Camp Hospital No. 1, then operated by the 1st Division. Fourteen cases occurred between March 2 and 9 (the diagnosis was based on the clinical picture and a throat smear as there were no facilities for incubation of cultures at the camp hospital). On March 9 a mobile laboratory was sent out by the Central Office. All immediate contacts of the previous cases were cultured and the most intimate contacts, ten in all, were given a Schick test. One of those Schicked and considered negative after forty-eight hours developed diphtheria the next day. Two other new cases developed at the school the following day. Then all the 70 men occupying the same barrack and a few others, who were considered contacts, were cultured and given the Schick test. All who

had positive Schick reactions were given 1,000 units of antitoxin. The report does not give the number of carriers found. No other cases occurred at the time. Diphtheria, even in a small amount at such a school, is always serious and demands the most careful attention, for the personnel is drawn from many organizations, with the result that those who have become even temporary carriers by contact with a case offer a most excellent way to disseminate the disease throughout the Army when they return to their organizations at the end of the course.

A week later, March 25, a case of diphtheria occurred in one of the camps (Camp Travis) for the enlisted men on duty at General Headquarters. The case was at once sent to the hospital. All contacts were isolated, and the troops in the camp were quarantined. Owing to the seriousness of any epidemic at a general headquarters, drastic measures were at once instituted. A mobile laboratory was sent out from the Central Office. The entire camp of 468 men was cultured and given the Schick test. Sixty-eight gave positive Schicks, and 6 were withdrawn as carriers. No additional cases occurred.

Diphtheria in the 32d Division

The first diphtheria epidemic of any serious nature in the A. E. F. occurred in the 32d Division. From the time of arrival of this division in France (March 5, 1918) until the beginning of active operations at Chateau Thierry (July, 1918), the presence of diphtheria in this command was a source of constant anxiety, requiring the persistent efforts of special epidemiologists and laboratory personnel in order to keep it under control. The dangers resultant upon the presence of diphtheria in this particular division were enhanced by the fact that it was functioning at this time as a replacement (or depot) division, thus affording an easy path for scattering the disease throughout the combat divisions.

Prior to the arrival of the division in France, the first case of diphtheria of which there is a record occurred in the 119th Machine-Gun Battalion, just before leaving Camp MacArthur (on February 4, 1918) at Waco, Texas, where the division was organized in August, 1917. Another case developed in this same outfit en route to Camp Merritt, New Jersey, where the division was assembled prior to embarkation for France. One case developed in the 127th Infantry while at Camp Merritt. This regiment disembarked at Bordeaux on March 7, having been detained in the harbor on board ship for three days. While at sea, one man in Company G had developed diphtheria and died. This regiment was held in the concentration camp at Bordeaux for several weeks, not reaching Prauthoy (10th Divisional Area) until April 10, where it rejoined its division. While at the Bordeaux camp six more cases developed in Company G and a number of other cases in Com-

panies I and L (four cases occurring in one billet). While there most of the men, according to their statements, were cultured by the base laboratory, but no reports of the findings were made to the division, regimental, or battalion surgeons and therefore no carriers were removed. The presence of diphtheria in this regiment did not come under the attention of the Central Office until it reached its divisional area in April. (The record of this regiment will be completed in a later paragraph because of its late arrival in the division area.)

The 119th Machine-Gun Battalion reached the 10th Divisional Area on March 11. After leaving Camp Merritt, two more cases developed on the transport. These were left at Brest, where they landed on or about March 5. The battalion, after reaching the division area, (March 11), developed four more cases in the first two days. Action was then taken by the Central Office. An epidemiologist, with laboratory assistance, went to the division. The entire battalion, at this time consisting of only Headquarters Company and D Company, comprising 7 officers and 135 men, were at once cultured and Schick tests made. This resulted in the discovery and isolation of 23 carriers (17 per cent of the command) and the immunization of all susceptibles (those showing a positive Schick test). All men were inspected twice daily, their bedding aired, and measures taken to insure the boiling of all mess-kits after meals. As a result of this action taken to control the beginning epidemic in the 119th Machine-Gun Battalion no further cases developed. Results were not always so pretty or satisfactory, however.

This divisional area had never before been occupied by American troops. The resultant necessity of billeting troops in dirty, poorly ventilated barns and stables, with frequent overcrowding, was always an important factor in rendering difficult the control of this disease in these troops already very generally exposed to recent cases.

The 128th Infantry landed at Brest on March 5 and reached the Prauthoy area March 12, the day following the arrival of the 119th Machine-Gun Battalion. Prior to March 10 the only cases occurring in this regiment were confined to Company A of the 128th, with the exception of one case in Company D, which developed on the train between Brest and the Prauthoy area. This case was left at Base Hospital No. 17 when the train passed through Dijon. The 128th Infantry had crossed on a transport in company with the 121st Machine-Gun Battalion, 311th Field Signal Battalion, and 200 casuals. Upon arrival at Brest they were held on the boat three days. After landing, the 128th Infantry was detained in barracks at the debarkation area for two days, where they were quartered with the 127th Field Hospital.

From Brest they went direct to Prauthoy on troop trains, arriving there March 12. Several cases of clinical diphtheria, which had developed in Company A on the transport, were left at the base port, and five other cases were put off the train at Dijon (Base Hospital No. 17) on the night of March 11. One of the latter cases died during the night of March 11.

In order to check this epidemic, work was begun March 13 on Companies A and D (the companies known to be the worst infected) by special personnel sent out from the Central Office. The active cases were at once sent to Dijon (Base Hospital No. 17). All carriers were withdrawn as soon as diagnosed and placed in Camp Hospital No. 10 at Prauthoy. Then, after all susceptibles had been immunized with antitoxin, it was planned to extend the work to the other companies previously exposed. However, while working with Companies A and D, cases of diphtheria developed in Headquarters Company, Companies G, K, L, and M, and in the personnel of Field Hospital No. 127 then operating Camp Hospital No. 10, so the plan was at once extended to include the culturing and Schick testing of the entire personnel of all companies in the regiment. The Schick reaction was read at 24 and 48 hours periods. All persons showing a positive reaction were given 1,000 units of antitoxin. Cases with suspicious throats were sent to Base Hospital No. 17 immediately after culturing. Cases with positive throat cultures showing no clinical symptoms were considered as carriers and sent to Field Hospital No. 127 (then operating Camp Hospital No. 10, the Area Camp Hospital). The work was interrupted when the division received orders to move to another area. As a result Companies E and F did not get cultured or immunized. These companies, however, had been isolated from the rest of the regiment for twelve days in a separate town. No suspicious cases occurred in them. Company C was not immunized because of orders to depart before the Schick tests could be read. This epidemic was apparently under control on March 23, no new cases having developed in any company up to that date, after it had been cultured and immunized, except as follows: One new case each occurred in the Medical Detachment of A Company; Band Detachment of B Company; D Company; and L Company. The contacts of each case were immediately isolated and cultured. No secondary cases developed to any of these. D Company, however, was entirely recultured, owing to the uncertainty of having reached all the contacts of this case. The special officer was now brought back to the Central Office. A sanitary corps officer with a mobile laboratory was left there to complete the work of releasing the 145 carriers still held at Field Hospital No. 127. Only four of these persisted as chronic carriers. These four were transferred to Base Hospital No. 17. The

others were returned to duty with their commands. This investigation between March 13 and 23 required 2,446 throat cultures and 1,726 Schick tests. It resulted in the diagnosis of 56 cases of diphtheria (20 in Company A, and 18 in Company D, the rest being scattered in five companies) and the detection of 161 carriers (8 per cent), while 237 healthy contacts (13 per cent) with positive Schicks were immunized. The subsequent history of this regiment was very satisfactory, as there were never more than occasional sporadic cases among its personnel while in France. The additional cases in the 128th were as follows: A Company had another case May 21. E Company had one case May 1 which led to finding one more carrier in the regiment on May 4. F Company had one case May 16. G Company had one case May 31. 128th Machine-Gun Company had one case April 28. (NOTE: E and F Companies had not been immunized.)

Almost immediately after the completion of the work with the 128th Infantry the 127th Infantry began to arrive in the Prauthoy area from Bordeaux (April 10), where, as already stated, they had been held several weeks, during which time quite a number of cases of diphtheria had occurred. The same day (April 10) that the 127th arrived in the Prauthoy area, 5 more new cases of diphtheria occurred in G Company. The divisional laboratory began to culture Companies G, I and L, in which practically all the previous cases had occurred, as soon as these companies arrived in the divisional area. All carriers were removed to Camp Hospital No. 10 as soon as discovered. Unfortunately, all the other companies of the 127th had been more or less exposed to the cases in G, I and L Companies, en route. In addition, upon arrival in the divisional area, F Company (having no previous cases) had been placed in the same town with G Company, while I and L Companies were placed in another town with K Company (like F Company, uninfected). The work was continually handicapped by the assignment to the regiment, from time to time, of small groups of replacements who had been exposed to diphtheria, thus frequently reintroducing the disease. Knowing that diphtheria had been giving considerable trouble in the regiment at Bordeaux, together with the experience we had already had with the 128th, extensive laboratory work was begun at once. The divisional laboratory was reënforced from C. M. D. L. and an epidemiologist from the Central Office placed in charge of the work. The record of the work performed, as well as the subsequent case development in the regiment, can best be appreciated by discussing the companies by groups according to the way they were billeted (and consequently exposed to each other) rather than in alphabetical order.

Companies F and G were billeted in the same town. Both companies

arrived in the town on March 10. In G Company 5 cases developed on the 10th and 3 on the 12th. The entire company was cultured on the eleventh day by the divisional laboratory and 11 carriers withdrawn. One new case occurred on March 24 and the final one on the 28th. The company was again cultured and, in addition, Schick tested on the 30th. Eleven more carriers were withdrawn and all with positive Schicks immunized. F Company, having been free of cases so far, developed one case on the 15th, five days after entering the town with G Company; 194 cultures were taken and nine carriers found. Another case occurred on the 27th. The entire company was recultured and, in addition, Schick tested on the 28th. Four more carriers were found and all men giving positive Schicks immunized. One more case, the last in this company, occurred May 2. His culture and Schick test had been negative on April 29.

I and L Companies, which, like G Company, had a history of numerous recent cases of diphtheria among their personnel, were placed in a town with K Company. I Company had another case on April 17. Cultures taken at that time located only one carrier. Another case developed April 20 and 3 more cases April 25. The entire company was recultured and Schicked on the 26th. Two cases and 6 carriers were found, and cases showing positive Schicks were immunized. One case and 4 carriers came from the same billet. L Company, which had been cultured on arrival, April 10, had one case on April 21, 3 cases on the 22d and 2 cases on the 26th. The entire company was recultured and Schicked on the 26th. Thirteen carriers were found and men with positive Schick reactions were immunized. A final case developed on May 2. K Company, previously free, developed no cases until May 27, and only one case occurred at this time. Sixteen contacts were examined but no carriers found. No subsequent cases occurred. Attention is called here to the fact that, while the withdrawal of carriers did not check the spread, reculturing associated with immunization of susceptibles did in each case.

A, B, C and D Companies developed no cases. Six carriers were found in following up contacts with cases in other companies.

Headquarters Company had 2 cases on April 13. Six carriers were found among the contacts. One more case occurred May 1. One carrier was found among the contacts to this case.

The 127th Machine-Gun Company had one case on April 24 and 2 cases on April 26.

The Division Intelligence School Detachment of the 127th Infantry had one case. When this case developed in the Intelligence School on May 7, 32 contacts were cultured and Schicked. One soldier from

the 126th Infantry, whose Schick test and culture were both negative on May 9 at the school, developed diphtheria on the 11th after returning to his regiment. His 13 contacts were cultured and Schicked. One other secondary case developed on the 13th and was similarly handled, except that, since the division was moving to Alsace, the 15 contacts of this case were left with a medical officer, a cook and two weeks' rations. They rejoined the division later. This work of the Central Office with the 127th extended from April 13 to May 3. It required 913 cultures and 1,051 Schick tests. It resulted in the discovery of 14 clinical cases, 22 carriers, and the immunizing of 224 susceptibles.

The division moved into the line near Belfort, Alsace, on May 14. From this time on until July 22, when the division was relieved and ordered to Chateau Thierry, where it arrived July 29, there was some diphtheria constantly occurring in the division. The cases, however, were sporadic. The 32nd Division had 21 cases of diphtheria during May. During their stay in Alsace the portable division laboratory, which had joined the division on April 5, handled all the required cultures without outside laboratory aid. After July 18 the epidemic had largely disappeared (only a case every few days). The divisional laboratory reported only 3 throat cultures in August, and 21 in September, as contrasted to 789 in July, and 2,202 in May.

While holding the sector of the line in Alsace it became necessary to devote a field hospital to contagious diseases and concentrate all diphtheria cases there. The divisional laboratory was stationed at this hospital. This plan was adopted after finding a moderate increase of cases in the latter part of May resulting from the partial loss of early control of contacts with fresh cases, due both to the confusion of moving into a new area and to the fact that they had depended at first on a French hospital which failed to notify the division as soon as a case of diphtheria was diagnosed.

The other regiments of the 32d Division were practically free at all times from diphtheria. The 125th Infantry had 4 cases between May 25 and 29. The 126th Infantry had 8 cases between April 24 and May 25. These were promptly controlled by both the withdrawal of 15 carriers found among the contacts and the immunization of susceptible individuals among those who had been in any way exposed to these cases.

In looking back over the ravages of diphtheria in this division there are two striking points where improvements could have been made in control. Both occurred in the 127th Infantry. First, the work done at Prauthoy should have been done in the three weeks while the regiment was held at Bordeaux. Second, if the first culturing of each com-

pany by the divisional laboratory men had been associated with immunization, as in the case of the reculturing, it is highly probably that the extensive reculturing would not have been necessary.

Diphtheria in the 35th Division

The other big problems offered by the presence of diphtheria among troops in the field was in the 35th Division. This was similar but less acute than in the 32d, not epidemic, but widely scattered, dribbling cases. It required, however, almost constant attention for four months (June to September, 1918, inclusive) before it reached a point where it was no longer dangerous. This division had a number of cases at Camp Doniphan prior to leaving the United States. One report says: "Many cases each week." Diphtheria became more prevalent during the ocean voyage. On arrival in England the division stayed there some time, and cases of diphtheria began to appear in considerable numbers. The outbreak from the very beginning was one which did not limit itself to a single organization, but showed a wide scattering of foci of infection. Thus, in the week ending May 29, there were, according to British reports, 27 diphtheria cases distributed as follows:

137th Infantry, 1st Battalion	1
3d Battalion	1
138th Infantry, 3d Battalion	1
139th Infantry, Headquarters Company	3
1st Battalion	3
2d Battalion	3
3d Battalion	2
Machine-gun Company	1
140th Infantry, 1st Battalion	2
2d Battalion	6
110th Engineers	4
Total	27

The same was the case for the week ending June 5, only the incidence of cases was slightly diminished.

On June 5 the division was again crowded on trains for two days and moved to an American area in France. On June 12 cases began to increase, and in the same scattered manner as in England. Between June 12 and 17 there were 20 cases, not more than 2 being in any one company.

Owing to the scattered nature of the cases and the fact that the division was to move again the next day, such extensive work as has been described in the 32d Division was, at least for the present, out of the question. Consequently, 30 to 40 immediate contacts with each case were cultured, 483 cultures in all being made. These resulted in the withdrawal of 7 carriers. No Schick tests were done, for even if they

could have been read during the move (which was unlikely), antitoxin could not safely have been given on the trains.

The division moved into the 3d Army Corps and was given a sector of the front in the Vosges Mountains to hold. The troops were distributed both in billets and dugouts. The sector had a 20-kilometer front and an area of 500 square kilometers, which complicated any attempt at control but which also diminished any chance of contact between organizations larger than companies.

The method of control adopted here was that of culturing and Schick testing all immediate contacts while in the front-line dugouts, and then systematically examining the entire company when brought out into rest billets at frequent intervals. This laboratory work, while in the Vosges sector, was done by a mobile laboratory and two officers, assigned temporarily to the division by the Central Office. The laboratory reached the division on June 29, just as it was taking over the sector. No time, except that required by the move, was thus lost in following up the preliminary work done just before they were ordered to leave the back area. Twenty-eight cases occurred between July 1 and August 12 while in this sector. They were distributed as follows:

137th Infantry: Total of 17 cases (14 arose while in dugouts). C Company had 6 cases while in the trenches. The entire company was cultured when it came out of the trenches into rest, and 6 carriers were withdrawn. Two more cases occurred four days later. The company was recultured and Schicked. Three more carriers were found.

138th Infantry: Total of 6 cases. B Company had 2 cases. These were reported very early with only slight sore throat. All contacts had negative cultures. No further cases developed. In E Company 4 cases occurred while in dugouts. The entire company was cultured when relieved, and 10 carriers were withdrawn. No subsequent cases developed.

139th Infantry: D Company had 3 cases while in the trenches. No carriers were found in the immediate examination of contacts, but 3 were found later on examination of the company after being relieved from their turn in the trenches.

On August 14 the division was again moved. The division's portable laboratory, now the only laboratory with the division, was packed up and never again reopened until after the armistice. Prior to the Meuse-Argonne offensive the laboratory was stored at the Army Supply Depot at Vaubecourt. During this time, although urgently needed to examine immediate contacts, it was unavailable. Over 50 cases of diphtheria occurred in the division between August 14 and September 2. The cases, however, seemed to be diminishing by the middle of September prior to the Argonne offensive, in which the division was one of those

starting the attack on September 26. Oddly, during these last two weeks of August, most of the cases were occurring in one company of the 139th Infantry. This company had been completely cultured twice and Schicked, besides being subjected to daily throat examinations and iodine swabbing.

The general situation of diphtheria in the American Expeditionary Forces, just between the time it had been quite well controlled in the divisions during the second period and before the problems again manifested itself during the third priod (the period of active fighting), in the hospital centers, is well shown in a letter quoted in its entirety:

FRANCE, 3d *August*, 1918.

From: Chief Surgeon, A. E. F.: S. O. S.
To: The Director of Laboratories, A. P. O. 721.
Subject: Diphtheria.

1. Of 95 cases of diphtheria reported since July 21, 20 occurred in troops in England recently arrived at Base Port. Of the remaining 75, 66 occurred in Infantry, Field Artillery and Engineering regiments, and in Hospital Organizations according to the accompanying lists, and the remainder scattered in other organizations in various parts of France.

It is evident from a glance at the list that, atlhough, the great majority of the cases developed in and were received from organizations taking part in the recent and continuous active operations at the front, there is no such grouping of cases as would justify any study of the conditions in the field with the view of detecting sources of infection or controlling carriers.

It is not recommended that any effort be made from your office to assist the Field Organizations at present, so far as concerns the incidence of diphtheria.

By direction:

(Signed) HAVEN EMERSON,
Major, M. R. C.

During the third period which covered our active operations, extending practically from the time of troop concentration prior to the St. Mihiel offensive through the subsequent Meuse-Argonne offensive, the presence of diphtheria was no longer of great concern to any combat division. Cases were at once evacuated even before confirmation of the diagnosis in a suspicious case. As a result, diphtheria began to manifest itself in the hospital centers of the S. O. S. The control of diphtheria in the hospital centers was taken care of by the center laboratories and in no case required reinforcements from the Central Office. The presence of diphtheria in a hospital center was a local problem, and, owing to the way it was handled in each incidence, never became a general A. E. F. problem, as in the case of the 32d Division especially.

Diphtheria in the Mesves Hospital Center

The Mesves Hospital, one of the first to be affected, had an average of about 18,000 patients during the last three months of 1918. Base

Hospital No. 54 (one of the Mesves Center hospitals) found that 1 per cent of its cases during October were due to diphtheria. During this month only 3 cases had occurred among nurses and 2 cases in the enlisted personnel of Base Hospital No. 54. In the first half of November, however, this hospital had 16 cases originate within the hospital (among patients and personnel) out of a total of 34 cases occurring in the entire center. This outbreak occurred coincident with the maximum period of overcrowding in the wards and overwork of its personnel. The following regulations in force at the center proved inadequate to prevent the outbreak in November:

(*a*) Culturing of every suspicious throat that was seen for any reason.

(*b*) Immediate transferring of cases that were positive either clinically or culturally and also detected carriers, to a special ward in Base Hospital No. 50. In this ward all the attendants were masked and isolation enforced.

(*c*) Culturing all contacts of cases. All other patients in the same ward where a case developed were considered contacts. This work was done by the sub-laboratories attached to each base hospital. From November 1 to November 13, inclusive, 652 cultures of this kind had been made by the sub-laboratory of Base Hospital No. 54.

(*d*) All carriers and cases were held in Base Hospital No. 50 until three successive negative cultures at 48-hour intervals were obtained.

(*e*) All the personnel of Base Hospital No. 54 had been cultured for possible carriers.

(*f*) Boiling of mess-kits, and dishes after each using.

(*g*) A careful spot map had been kept showing the exact place where each case had developed in the hospital center.

The following additional regulations were found necessary before the epidemic was controlled.

(*a*) Contacts (the whole ward) were to be given the Schick test as well as cultured. Positive Schicks were to be given immunizing doses of antitoxin (the whole ward was taken as a unit of contacts as other methods of determining contacts were considered too inaccurate for use in hospital wards).

(*b*) Every attendant of diphtheria was to have a negative Schick.

(*c*) All culturing, etc., in this work was to be done directly by the center laboratory and not by the sub-laboratories of the hospitals. This will have the result of rendering the whole work entirely systematic.

(*d*) Daily inspection of the throats of all physicians, patients, nurses and enlisted personnel of Base Hospital No. 54.

During the operation of the Mesves Center, from October 1, 1918, to February 1, 1919, the control of diphtheria required 16,636 throat cultures, 782 of which were positive.

Diphtheria in the Allerey Hospital Center

The presence of diphtheria in the Allerey Hospital Center also created quite a problem locally. The first case occurred September 24, 1918. Two more arose October 1, another on the 5th, one on the 8th, three on

the 9th, and so on until, from November 10 to December 8, the hospital reported from one to seven new cases daily. This hospital center consisted of the typical one-story wooden barracks covering an area of one square mile. It was handling over 17,000 patients at a time with 3,000 personnel. Considerable overcrowding of its wards occurred during October and November. Seventy patients were occupying the normal capacity fifty-bed barrack at the time of the outbreak of diphtheria. Many of the cases early in the epidemic were in patients evacuated as "gassed." This often resulted in delayed diagnosis, since a sore throat or even a membranous condition in a gassed case, certainly early in the epidemic, was not regarded with the same suspicion as in a normal case because the condition was commonly assumed to be a result of the gas irritation. This resulted in letting the epidemic get fairly well under way before its extent was suspected. As soon as the case incidence began to assume epidemic form, systematic laboratory investigations were made to locate and isolate all carriers.

In Base Hospitals Nos. 25, 26 and 49 (also belonging to the center) several nurses and hospital corps men were picked up as carriers, who had been known carriers in the States but who had been previously released on three negative cultures and sent overseas.

In Base Hospital No. 25, 75 carriers were found; 33⅓ per cent of these gave a history of being gassed, while out of the 35 clinical cases in the hospital only 5.7 per cent had been gassed.

The entire epidemic required 13,284 cultures, of which 246 were positive. The success of the work in controlling this epidemic was attributed largely to success in obtaining early diagnosis with the immediate isolation of cases, suspects, and contacts. The extensive culturing of wards which was adopted in the search for carriers brought out a danger to be guarded against in this sytem. It gave some at first a false sense of security and led them to be lax in enforcing regulations like the use of a face mask and other such measures commonly employed. The search for carriers was confined to examination of the contacts of each fresh case (this included the entire ward or barrack where the case arose). It would have been useless to have cultured the entire center as this would have taken eight days, since the incubator space was limited to 2,000 cultures daily. Only 1,363 Shick tests were done, owing to a temporary shortage in the toxin supply. However, out of these, three of the hospitals showed 8 per cent positive, one 6 per cent, and one only 6/10 of one per cent respectively. The small percentage in the last hospital indicates a flaw probably in the technique of interpreting the reaction and emphasizes the importance of uniformity in administering and reading the Schick test.

(*To be concluded*)

AN OCCURRENCE OF RAPID ABSORPTION OF CATGUT SUTURES—IN THE LIGHT OF A POSSIBLE BALANCE EXISTING BETWEEN DIGESTION AND ENCAPSULATION PROCESSES IN THE ATTACK UPON A FOREIGN PROTEIN

By NORVELLE WALLACE SHARPE, M.D., F.A.C.S.[1]

I

AT THE Post Hospital, Carruthers Field, in November, 1918, Private J. D. L. was transferred from the medical service to my service with a tentative diagnosis of appendicitis. This was confirmed by examination which found a painful appendix, somewhat obscurely outlined, moderately enlarged in diameter, apparently less than 8 cm. in length. It seemed probable that it was retrocecal. Neither the general nor local condition seemed critical; and as orders had but recently come through from the Surgeon General countermanding all operative work save that of urgency, the patient was put on the Ochsner regime and kept under observation. Improvement was steady, the acute syndrome disappearing within 50 or 60 hours.

By this time study of the antecedent history had developed the facts that for the past ten or twelve years the patient had had more or less constant (and frequently acute) gastro-intestinal indigestion; his appetite was habitually capricious, ranging from almost complete anorexia to pronounced voracity. His strength averaged definitely below par; bowel movements were irregular, with tendency to constipation. He was nervous, anxious, and somewhat irritable, his skin surprisingly clear, tending to the ruddy type. He was distinctly discouraged regarding his personal efficiency, realized his physical inadequacy, and desired relief. The question of precedent appendix outbreaks could not be absolutely determined from the anamnesis, but it seemed highly probable that a long-standing, low-grade appendicitis was *l'agent provocateur*. Operation was determined.

When section was made, the visceral and parietal peritoneal layers were found adherent over ileum, cecum, and proximal colon. In this vicinity neither small nor large intestine was visible, both being thoroughly encapsulated by the densest Jackson's membrane that it has been my fortune to encounter. Removal of this membrane proved both tedious and time-consuming. Numerous substantial varicose

[1] Late Captain, M. C., U. S. A.; assigned with Air Service Division of Military Aeronautics.

vessels were encountered; calibers up to 3 mm. were not rare; dense adhesions were widely disseminated. The appendix was found retrocecal, moderately enlarged, harboring one or two small concretions, intensely engorged. Routine removal followed, and the thankless task of covering numerous abraded areas, developed by the dissection, completed. The intermuscular abdominal wound was closed, without drainage, in tiers, including silkworm gut right-angled tension sutures, and a subcuticular No. 3 catgut tier.[2]

The next three or four days proved somewhat stormy; moderate tympany, abdominal griping, and vomiting were in evidence. Routine measures of relief proved adequate. The patient's complaints of discomfort and pain were grotesquely disproportionate to the actual physical status.

Thinking that possibly the prolonged and repeated straining had somewhat impaired the wound fixation, the patient was ordered for dressing on the fourth day. Inspection showed complete diastasis of the skin and superficial fascia ranging up to 10 mm.; and doubtless would have been greater save for the unimpaired support afforded by the tension sutures. The subcuticular catgut suture was practically completely digested; nothing remaining save an occasional attenuated fragment and the terminal knots, and even these were in a state of slimy disintegration.

Without anesthesia, an over-and-over catgut tier suture was introduced, including skin and subcutaneous fascia. By an odd error my nurse supplied me with a double No. 3 catgut suture.[3] This (to avoid delay) was employed without alteration. The tension sutures were removed, and smooth re-apposition of skin and superficial fascia was secured. Nothing of significance followed. Examination of the dressings on evening rounds of the fourth day showed a moist stain over the wound. Redressing the next morning (fifth) revealed complete digestion of the double catgut through-and-through sutures had taken place. At this time, as sundry tissue bridges had formed, the Carrel-Dakin sequence was established, and further progress ceased to be significant.

SUMMARY

1. Digestion of No. 3 catgut subcuticular suture noted morning of fourth day.

2. Digestion of double through-and-through No. 3 catgut suture noted morning of fifth day.

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[2], [3] This size has been recorded from memory; it is safe to say that it was not smaller.

II

We have sadly lacked definite data regarding the action of enzymes, but some experimental studies[4] which I have been privileged to share with Professor Pohlman, extending over a period of three or four years precedent to service with the colors, would lead to the conclusion that a substantial amount of a foreign protein, introduced within the tissues, is digested *in situ;* that non-digested particles, and those partially digested, are transported to, and ultimately through, the lymphatic channels.

In brief this series of experiments tends to show the existence of at least three definite processes associated with the absorption, or other disposition, of an alien proteid: (1) the development of a proximal digestion zone contiguous to the foreign body (lymphoidal cells); (2) of an intermediate zone (largely endothelial leucocytes); (3) of a distal encapsulation zone (constructed by fibroblasts).

Proceeding centrifugally, it has been observed that the digestion cells (lymphoidal) apparently attack the foreign protein by means of enzymes and appear to be stimulated by the end products of digestion; that the intermediate cells (endothelial leucocytes) appear to serve solely as carriers, and that they penetrate through the zone of encapsulation, transporting undigested particles into the lymphatic stream; that the cells of the zone of encapsulation (fibroblasts) seem to be inhibited in the production of definite scar tissue by the seepage of digested material, produced by enzymic action of the lymphoidal cells of the digestion zone upon the foreign proteid.

Or, phrased somehwat differently, we have found that the more readily an alien protein is digested, the more rapid is such digestion; because of apparent stimulation of digestion cells, the more readily an alien protein is digested the greater the inhibition to encapsulation processes; *per contra* the more the encapsulation process is inhibited the more free will be the circulation and transportation of digested material and this in proportion to the relative fenestration of the interposed barriers.

III

In the absence of carefully stained serial sections of the operative field as herewith presented, extending from the point of insertion of the sutures up to, and including, lymphatic channels, and furthermore assum-

[4] These studies are, as yet, incomplete; hence we are not prepared to submit final conclusions. We are, however, willing to submit the following notations which developed as a by-product in the consideration of our primary problem. To our minds the clinical phenomena recorded in Section I correlate with our laboratory findings in a fashion that is highly suggestive and stimulating.

ing that the catgut employed differed in no essential from that furnished my service, we are hardly justified in affirming more than the statement that in this instance an unusual biochemic status existed which produced digestion phenomena more intense and more rapid than normal.

But had time and occasion and facilities warranted, it would have been an interesting study to have tested the enzymic reactions of this man to other alien proteins; likewise to have permitted him the task of digesting autogenous sutures.

A NEW APPLIANCE FOR "FLAIL" ELBOWS

By FRANCIS S. CHAMBERS, M.D.
Late First Lieutenant, Medical Corps, United States Army

(With eleven illustrations)

DURING the late war there were a number of severe gunshot injuries of the elbow joint, accompanied by extensive comminution of the bones forming this articulation. In many instances the fragments, including the articular surfaces of one or more of the bones, have been removed. Frequently the resection has included several centimeters of the shaft of the humerus, and, although at times done subperiosteally, there has often been little or no regeneration of bone in the months following. While in some cases lives have been saved and amputations avoided by such radical procedures, "flail" elbows have usually been the final result.

On the other hand, civil surgery occasionally gives us instances of "flail" elbows (*i. e.*, following radical resections of the elbow joint). Such mutilated joints have been a great handicap, and to obtain satisfactory function in such cases is a problem.

During my recent service at the Walter Reed General Hospital there were several cases of "flail" elbows, and the opportunity was afforded me to design an appliance which has given satisfactory results —in fact, far better than was at first expected.

All of the cases were of the same type, characterized by loss of the capitellum, trochlea and part of the shaft of the humerus. The loss of bone is shown by Figs. 1, 2 and 3 better than words can describe. Two cases have been selected for purposes of demonstration; one has been under observation for a few months, and the other was admitted to the hospital a few weeks ago.

Voluntary flexion is not often possible if there is considerable loss of the shaft of the humerus. If the loss of substance is not too great, the end of the humerus may act as an imperfect fulcrum and a certain amount of flexion be thus obtained, and then as a rule only when the arm is steadied in a certain position. Sometimes flexion causes pain. This is due to the fact that the intervening tissues are compressed between the forearm bones and the end of the humerus, and the pain is especially marked if the latter is somewhat sharp (see Fig. 1).

When flexion is attempted, the ulna and radius are drawn upwards, and often by the time the bones have reached the end of the humerus the muscles have expended their maximum effort, and there is little or no power left in them to continue the movement. Besides, the

triceps sometimes contracts and the flexors are compelled to overcome this added resistance.

However, if a fulcrum be supplied, a certain amount of flexion will be obtained. Fig. 4 illustrates the maximum voluntary flexion possible in Case No. 1. The prominence made by the head of the radius can also be seen. By placing the thumb of the right hand (left hand for right arm) above and a little in front of the head of the radius, and the index finger above the inner lip of the articular surface of the ulna, we can supply this fulcrum (see Fig. 5). To execute this maneuver, the grasp above the bones is gentle and moderately firm; downward pressure is made with the hand, just enough to counteract the upward displacement, and at the same time the hand is allowed to rotate as flexion progresses.

In the appliance, the pressure of the thumb and the index finger is replaced by the fulcrum pads (see Figs. 6 and 7). They are shaped like an inverted "L" and make pressure above and in front of the head of the radius and inner lip of the ulnar articulation. The pads are sewn on metal and are sufficiently thick to prevent the uncovered portion of the metal from pressing on the skin over the bones. The pads in the apparatus, shown in Fig. 6, are mounted on an aluminum collar, the ends of which are specially shaped to receive them. This collar must be stout enough to hold the pads in position and prevent the apparatus from spreading when flexion is attempted. In the other model, which is the better, the forearm band *B* (Figs. 3 and 7) is made of aluminum and serves the same purpose.

The metal carrying the pads is rigidly riveted to two hinged flat bars, placed on either side of the arm just below their hinges. By having the pads fastened to the bars below the hinges they must move with the forearm and thus maintain the same relations to the ulna and radius at all times. The bars above the hinges lie on the sides of the arm and are attached to a leather cuff, which encircles the arm just below the axilla *E* (Figs. 6 and 7), the upper edge of which is covered with a fold of chamois where it bears against the axillary folds during flexion. They maintain the length of the arm during flexion and prevent the dragging upwards of the forearm bones. The pads being "L" shape, as stated above, the horizontal portion receives the upward pull of the ulna and radius during the early stage of flexion and, as the movement progresses, the pads turn with the forearm, and the descending portions then come to lie superiorly and act the same way. Also, the forearm band *B* (Figs. 3, 6 and 7) helps to maintain the proper relations of the forearm.

In the second appliance (Fig. 7), the forearm band being made of

metal and rigidly fastened to the side arm, the patient first passes his arm through the axillary cuff and then adjusts it to his arm from the front. In the other, where the collar embraces the elbow posteriorly (Fig. 6), the appliance is put on from behind and the forearm band *B* consists of a tape and buckle.

The terminal band *F* (Figs. 6 and 7) is riveted to the forearm bands and holds them in relation to the forearm. By placing a strap and buckle posteriorly close to the elbow *G* (Fig. 7), backward displacement of the ulna and radius is prevented when flexion begins. The hinge joints of the side bars must be parallel and even with each other—this is important. The bars may, however, be bent to conform to the shape of the arm at other points. The hinge joints must also lie directly above the ends of the bones about one-half inch. The mid-axis of the arm lies more anteriorly, but, if the joints are placed in front of the bones, the brachialis anticus and the biceps will lose their leverage.

The appliance is not difficult to make. The flat-hinged bars can be obtained from the supply houses; they should be light and rigid. The portion intended for the arm should be made long enough to reach from the elbow almost to the axilla; the leather cuff will complete the distance. It has been found best to have the upper edge of the axillary cuff about half an inch below the axilla. The forearm rods should extend almost to the junction of the middle and distal thirds of the forearm.

The fulcrum pads must be made carefully. Patterns are obtained by first marking on the skin the areas where pressure is desired. Thin paper is placed over the markings and the outlines traced. They are then cut out, and the patterns thus obtained are used in shaping the pads. With the forearm in the same axis as the arm, the upper edge of the head of the radius and the inner lip of the greater sigmoid of the ulna are marked. At the anterior extremities of these markings a line is drawn downwards about 1 to 2 cm., in front of the bones. The tip of the olecranon is the point of the upper limits of the pads. This must be on the same level on both sides. The radial pad can extend a little posteriorly to the bone, but, if the ulnar pad is carried too far back, the pad, when completed, might make pressure on the ulnar nerve.

With the arm and the forearm in the same axis, it will be found that the lower border of the radial pad is below that of the ulna. With the forearm and arm in this relation, the head of the radius is a little below the level of the inner lip of the greater sigmoid. If it is desired to retain the "carrying angle," the lateral flat bars of the forearm C should be bent outwards just below the hinges, and, in marking the position of the pads, the arm should be held in the position desired. It will be found that the lower borders of the markings for the pads will then be on the

same level. However, there is not much to be gained by providing for the "carrying angle" in these cases. The hinges are placed equal distances below the superior borders of the respective pads, and for this reason it is necessary to have their upper margins on the same level.

Two pieces of sole leather are cut out, using the patterns obtained as mentioned; the desired thickness of felt is added and the whole covered with chamois. They are three-eighths to five-eighths of an inch thick. The completed pads are sewn with waxed thread to pieces of metal, which are bored to receive the stitches (see Figs. 3, 6 and 7). The "L" shape of the pads will leave a portion of the metal pieces uncovered, and this area is used to receive the rivets for attachment to the side bars. The pads are made sufficiently thick to make the desired pressure and at the same time prevent the uncovered metal from pressing on the skin. Aluminum is a good material to use, as it is easily bent to conform to the contour of the elbow.

If it is desired to mount the pads on a collar (Fig. 6), it is cut out and made to follow the contour of the elbow posteriorly and the ends shaped to receive the pads. However, the other model, shown in Fig. 7, is better, and the one shown in Fig. 6 has since been changed; that is, the collar cut off and a metal forearm band *B* added. The following remarks will apply to this second model.

The pieces carrying the pads are firmly riveted to the forearm bars, taking care to have the hinges on the same level with each other, about one-fourth inch below the upper border of the pads.

The forearm band *B* is next made. Aluminum sheeting one-sixteenth inch thick, folded double, is suitable; it should be 1¼ inches broad and the upper border is placed 1 cm. below the crease of the elbow. It is bent to conform to the shape of the forearm. With the band held in place, temporarily place the fulcrum pads and flat bars in position with the arm extended, so that the bars lie flat on the forearm beneath the band *B;* at the same time bend them to the contour of the forearm. The side bars *C* and the band *B* are marked, then rigidly riveted together and the excess of the latter trimmed off, etc. Temporarily the hinges will not be parallel, but by subsequently twisting the bars *C* the proper relations will be restored.

While the bars are held in position, the terminal forearm tape *F* is placed around the forearm and marked at the points where it is to be riveted to the bars *C*. Place the buckle posteriorly. Likewise, a piece of paper encircling the arm just below the axilla is marked to give the dimensions and points of attachment of the axillary cuff to the flat bars *D*. The cuff is about 2 inches wide and the smooth side of the leather placed against the skin. It can be laced, but it is preferable to employ

tape and buckle. The buckle should be placed externally where it is more readily reached by the patient. As already stated, the distance from the upper edge of the axillary cuff to the elbow should be about half an inch less than that from the axillary folds to the same point.

The apparatus can be completed without further description by referring to the illustrations. If accurately made, it stays in place, the fulcrum pads preventing it from sliding down on the arm and the axillary cuff preventing upper displacement. It is comfortable.

The pressure of the fulcrum pads causes no inconvenience. Case No. 2 has been wearing an apparatus of this design for nearly three months and up to the present time has experienced no discomfort. In Case No. 1 the scars are unfavorably placed and will need watching, although, after wearing the appliance two weeks, there has been no difficulty. When it is recalled that many amputés bear weight on the scars of their stumps, with a little care the moderate pressure of the fulcrum pads should cause no trouble.

Too much must not be expected when the appliance is first tried, for usually there is considerable muscular atrophy due to lack of use. The brachialis anticus and biceps are especially weak, and the brachialis radialis will also be impaired in proportion to the amount of loss of the external epicondylar ridge from which it derives a great part of its origin. Abduction of the shoulder is not often attempted, owing to the lack of lateral stability of the elbow, and marked weakness of the rotators inserted into the tuberosities of the humerus, as well as the deltoid, is to be expected.

Massage and electricity should therefore be employed, and, above all, special exercises and a few points regarding the latter deserve mention. These exercises at first must be assisted, for, added to the muscular weakness, there is also a loss of "muscle sense." So, often the initial attempts at flexion are accompanied by general spasmodic contraction, which includes the triceps as well as the flexors. Flexion exercises are executed by using the thumb and index finger to supply a fulcrum (Fig. 5). For the right elbow, the left hand is used, and the forearm is supported with the right. For the left elbow the hands are reversed. Abduction and movements of rotation of the shoulder are also assisted by holding the arm in one hand and the forearm in the other, with the elbow bent at a right angle.

Pronation and supination will frequently be found impaired by fibrosis between the head of the radius and the lesser sigmoid cavity of the ulna. Passive movements must be employed carefully to break up adhesions; the one hand holding the bones at the elbow, and the movements being executed with the other. Swimming with the appliance

FIG. 1.—Case No. 1, wounded at St. Mihiel, Sept. 17, 1918, by high explosive. Debridement with removal of bone fragments Sept. 20, 1918; wound healed March, 1919. Admitted to Walter Reed Hospital, July 23, 1919

FIG. 2.—Case No. 2, lateral view with forearm rotated to oblique position. Inner side of radial pad sketched in to show its relation to the head of the radius.

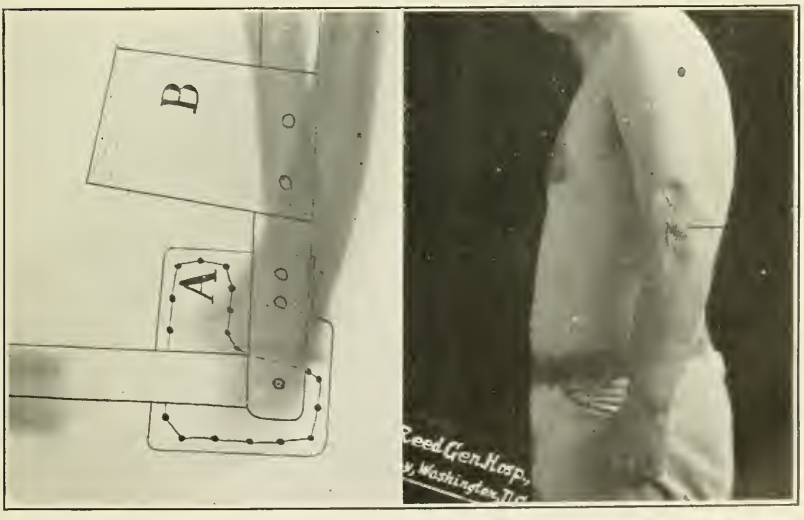


FIG. 3.—Case No. 2, X-ray with diagram of outer half of appliance in position. Outline of fulcrum pad shown by stitch markings, A. Observe that upward dragging of the forearm is prevented by the shape of the pad A, and the forearm hand, B.

FIG. 4.—Case No. 1, maximum flexion without assistance. A, prominence of the head of the radius. The scars are unfavorably placed and will have to receive the pressure of the fulcrum pads. Forearm and hand are normal; marked weakness of arm and shoulder due to lack of use dating from Sept. 17, 1918.

(To face page 444.)

Fig. 5.—Case No. 1, showing flexion possible if a fulcrum is supplied. The thumb of the right hand is making firm, gentle pressure just above the head of the radius and the index finger is pressing over the inner lip of the ulnar articular surface. The hand is pressing downwards to prevent shortening of the arm. Flexion about 100 degrees.

e *d* *a* *b* *g*

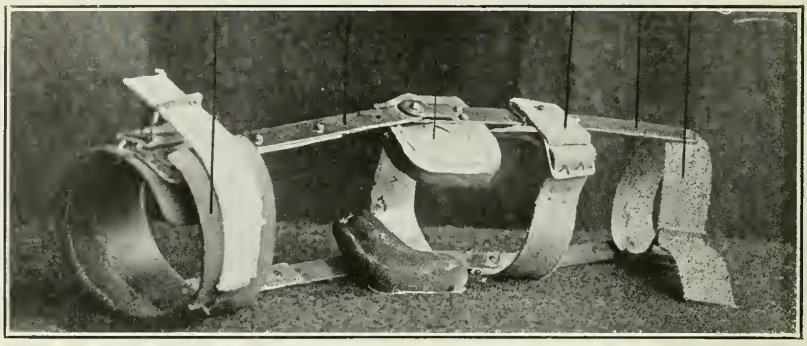


Fig. 6.—Front View of Appliance Used by Case No. 1.

a, Fulcrum pads mounted on metal collar which is rivited to forearm bars, *c*, just below the hinges; *b*, forearm band, buckle and tape (compare with Fig. 7); *c*, forearm bars; *d*, arm bars, it was necessary to piece them to secure the desired length; *e*, axillary cuff—the upper edge is covered by a fold of chamois where it bears against the axillary folds; *f*, forearm tape riveted to the forearm bars, *c*.

d *a* *g* *b* *c*

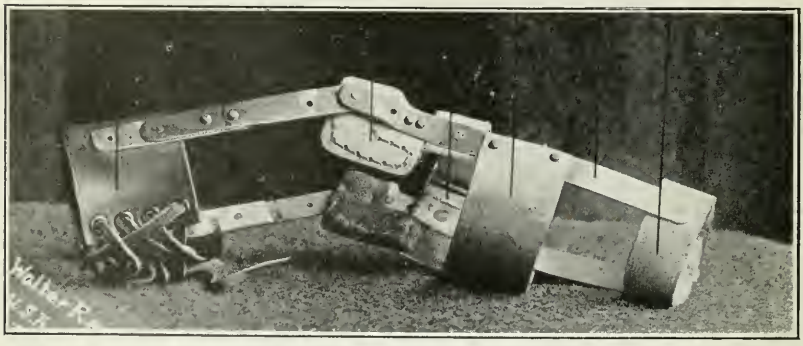


Fig. 7.—Appliance Worn by Case No. 2.

a, Fulcrum pads sewed to pieces of aluminum which are riveted to the forearm bars, *c* (compare with Fig. 6); *b*, forearm band of aluminum which prevents spreading of the appliance during flexion; *c*, forearm bands; *d*, arm bars; *e*, axillary cuff, laced; the buckle and tape are more convenient, see Fig. 6; *f*, forearm tape; *g*, tape and buckle added, it is necessary when the metal collar is not used. Compare Figs. 6 and 10.

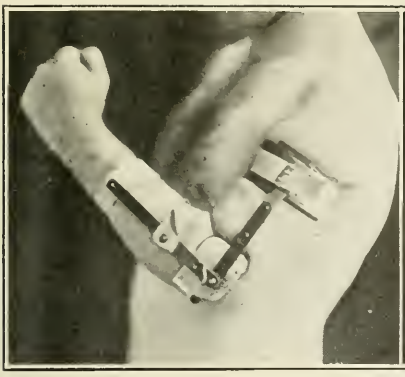


FIG. 8.—Case No. 1. Voluntary flexion to 90 degrees after wearing the appliance two days. Appliance shown in Fig. 6.

FIG. 9.—Case No. 2. Wounded July 20, 1918, at Soissons. Subperiosteal resection of lower extremity and several centimeters of the shaft of the humerus at a French hospital No drainage. Improvement following three months treatment. On admission, voluntary flexion was nil. Note that there are no skin disturbances due to pressure of the fulcrum pa ls.

FIG. 10.—Case No. 2, wearing appliance shown in Fig. 7. Note that the metal collar at elbow is omitted and a strap and buckle placed closed to the joint (*q*, Fig. 7), and that the forearm band is made of aluminum.

FIG. 11.—Case No. 2, results after three months treatment. Abduction of the shoulder to nearly 90 degrees and flexion of the elbow to 45 degrees.

on the arm is beneficial, as the water offers some buoyant support and encourages voluntary movement.

Patience is necessary, but the ultimate results will be very satisfactory. During the early days of treatment, a few attempts at voluntary flexion will often leave the flexors completely exhausted. A few months ago, before treatment was begun, Case No. 2 had no voluntary flexion at all, but at the present time he is able to flex his arm a little without the appliance and, in addition to increased strength of his muscles, he has apparently regained better control over their actions (see Fig. 9). With this appliance he can now abduct his shoulder to 90 degrees and, at the same time, flex his elbow to 45 degrees (see Fig. 11). He has fairly good use of his arm, can give a good hand salute, but there is still some weakness of the external rotators of the humerus; further improvement is expected. The first case (see Figs. 4, 5 and 8) demonstrates the results obtained after one week's treatment and employment of the appliance for only two days.

In some of the cases, regeneration of bone, and the formation of new callus on the end of the humerus, will offer mechanical obstruction to the coronoid process of the ulna during flexion; obviously no appliance can overcome this difficulty. It should be added that if the head of the radius and the ulnar articulation are missing, the fulcrum pads must be designed differently; they then should be made oval and placed just above the ends of the bones. The upward dragging of the forearm, after flexion has advanced forty-five degrees from full extension, will be prevented by the forearm band "B" (Figs. 3, 6 and 7).

Needless to say, if the bicepital tubercle of the radius or the coronoid process of the ulna is lost, satisfactory results are not to be expected.

An appliance of any kind is not a good surgical ideal, but is there any operative procedure which can restore, to these patients, better function or give results equally as good as an appliance of this kind.

Permit me to express my thanks to Colonel Glennan, commanding officer of the Walter Reed General Hospital, and to Colonel Keller, chief of the Surgical Staff, for the facilities which they afforded me in studying these cases and perfecting this device. I am indebted to Sergeant Hempel for his assistance in the workshop. The photographs were made by Private Hottman.

THE WARD SURGEON—HIS RELATION TO RECONSTRUCTION

By Major RICHARD B. DILLEHUNT

Medical Corps, United States Army

IF YOU ask a wounded soldier who his doctor was in France he will almost invariably recall a ward surgeon to whom he is very grateful. Even if he had numerous surgeons attend him during his evacuation from the front, and even though he may have been seen by consultants of great eminence professionally, and of high rank in the service, he will usually remember as having been most important to him and to his recovery, Captain or Lieutenant Somebody, a ward surgeon.

In this respect he is quite right, because it is conceded by everyone who has served in many capacities in the medical service that the ultimate result in a battle casualty is more affected by the judgment, skill and diligence of the ward surgeon than by any other factor. His degree of punctuality and care in carrying out surgical dressings can make, mar or ruin the hoped-for result of a surgical operation. He sees the soldier daily and becomes acquainted with him, and the soldier learns to know his doctor. Thus there is a mutual interest and their relationship becomes close and personal. There is perhaps no other instance in the Army in which intimacy of a certain degree arises between officers and men, not only without impairing the necessary military decorum, but cementing them in a common interest that augments it, as that which obtains between a good ward surgeon and his soldier patients. This relationship is simply an accentuated example of that which is known to exist between doctor and patient in civil practice, only in the military service the patient has no choice, and the ward surgeon goes through a very critical—almost cynical—probationary period with every soldier under his care, and it takes only about seventy-two hours for his standing as an officer and as a doctor to be definitely established. And they are usually correct in their judgment, because they know within that time how much interest he has in his work, and whether or not he goes about it as if he knows what he is doing. This feature offers to ward surgeons one of the most valuable benefits of the military service, namely, practice in making good with an ultra-critical clientele —a feature much overlooked in professional training.

But the object of this discourse is to point out the function of the

ward surgeon in reconstruction work other than that of a purely medical nature; and it is important.

My first impression of the importance of occupational aides was in France when I found that to go from a ward of unoccupied fracture cases to one in which the aides were accomplishing their work was like going from a boiler factory into a cathedral. It was there also that I saw the efforts of the aides in one ward completely annulled by the cynicism of a ward surgeon, and vitiated in another by a shrug of indifference, but fortunately nearly always happily consummated by an interest in and encouragement of both patients and aides, by the ward surgeon.

I cite this merely to show to what degree the ward surgeon's attitude can influence those soldiers in his care, and to urge the use of this influence in the betterment of the soldier's future by the encouragement of his vocational work and interest.

The mere fact that there are opportunities available, buildings provided, teachers assembled, and machinery and apparatus at hand is not enough to inspire the average wounded man to take advantage of them, particularly if he has been unoccupied over a long period. To supply the incentive, aides and special officers are detailed, and the fruition of their efforts has been astonishing, but if they are able to accomplish so much without the advantage of a personal relation to the soldier for some time, how much more could be done by the ward surgeon who has that advantage?

The ward surgeon who has an intense interest in the physical reconstruction of an individual soldier surely has some interest in his future material and economic welfare, and, if he is somewhat of a judge of human qualities, ought to be in a position to direct and advise in the vocational training of his men. This of course necessitates an acquaintance with the various branches of work that are available, the estimated capabilities and fitness of the patient, both physically and mentally, his former occupation, his future intention, and his adaptability. Who is there in a better position to determine these factors than the ward surgeon?

Not uncommonly in a ward of thirty patients it will be found that twenty are very much in doubt as to what they intend to do a year hence. Many may be engaged in a particular branch of vocational training which they don't care about, but would rather not say so; others don't want to go to their classes for some obscure reason; others have no idea as to what the ultimate outcome of their injuries will probably be, and would like to have an inkling; and still others have a lot of things they would like to know about, but aren't sure as to how to proceed to find out, and often for some strange reason don't ask.

If each felt that his own doctor, the ward surgeon, knew all about these things and was interested, he would not hesitate to ask for advice.

In all previous wars the disabled soldier has been allowed to drop rather abruptly, as soon as his wounds were healed, into civil life and often one of resentment. This will be prevented under the present comprehensive plan of graduating disabled men into usefulness to themselves and society, and still the one who will linger longest in each soldiers' mind will be the ward surgeon who will, therefore, be the most "sworn by" and necessarily the most "sworn at," and the latter can be greatly minimized if he will carry his interest and activity on beyond the purely medical and surgical work into the field of vocational reconstruction.

EDITORIALS

THE ANNUAL MEETING

The annual meeting of The Association will take place from the 13th to the 15th of this month at St. Louis.

The headquarters of The Association will be at the Hotel Statler and the hall of the hotel will be used by The Association for its business meetings and for the addresses which constitute the literary program. Endeavor has been made to present an interesting program, one which may be instructive as well as interesting. It is hoped that there may be discussion of the papers read. It seems to us that this is peculiarly useful in bringing out the points in any paper. It is the dressing on the salad which helps us to appreciate the flavor. Furthermore, a paper on any given subject is the opinion of one man together with his interpretation of the views of others on the subject, and his own views are corroborated by such evidence as he can find. It is always interesting, we believe, to know what the other man thinks as to your premises and deductions.

There are a number of questions of importance to The Association to be brought up, and it is earnestly hoped that there may be a large representation of the membership to aid in the determination of them.

From letters which reach us there appears to be a misunderstanding as to eligibility to membership. Many assume that because they have been mustered out of the service their eligibility "ceases and determines."

This is not so, as they may be elected to Associate membership. Speaking as a member of The Association and not as the editor, we hope that this may be so amended as to permit their election to the active list. An officer of the services who has been elected to active membership continues in that classification after his reversion to civil status. It would seem logical to us to still allow him to join the active list after his duty to the state is finished.

We print below the program for the meeting as arranged at present. There are other features to be added to it by the local committee at St. Louis and we have not as yet received their suggestions. We believe that the various sessions will have a live interest for all the members, and we earnestly hope that there may be a large and enthusiastic attendance at this the first meeting since the end of the war. In the November and December issues of the journal we expect to print the proceedings of the meeting. Come there and help make the proceedings!

There will be a Register Book at the Desk of the Hotel Statler. It is requested that members register in this when coming to the Hotel, in order that as full record of the attendance as possible may be kept.

Tentative Program, Annual Meeting of the Association of Military Surgeons U. S., St. Louis, Missouri

MONDAY, OCTOBER 13

Opening Meeting at 9.30 a. m.

1. Address of the President; Reports of Executive Council, Secretary-Editor and Treasurer, Committee on Arrangements, Literary Committee, Committee on Legislation, Boards of Award, Necrology Committee; Appointment of Nominating Committee, Auditing Committee, and Committee on Resolutions; Consideration of Amendments to Constitution and By-Laws; Miscellaneous Business.

2. Addresses: "The Next Steps in Combating Venereal Diseases among the Armed Forces of the United States," Col. William F. Snow, M. C., U. S. Army; "Logistics of the Naval Medical Department for Distant Operations of the Fleet," Capt. F. E. McCullough, M. C., U. S. Navy.

Second Session, 2 p. m.

1. Addresses: "Plan for the Immediate Care and Reconstruction of Battle Injuries of the Face and Jaws, Based on our Late Experiences," Lieut. Col. Vilray P. Blair, M. C., U. S. Army; "The Army Medical Museum," Col. Charles F. Craig, M. C., U. S. Army; "The Future of Psychiatry in the Army," Dr. T. W. Salmon.

Third Session, 8.30 p. m.

1. Motion Pictures showing activities of the Medical Department in France (one-half hour).

2. Addresses: "A Scientific Basis for the Greater Resistance of the Seasoned Soldier, as Compared with the Recruit, to Infectious Diseases," Col. Victor C. Vaughan, M. C., U. S. Army; "Pathology of Lethargic Encephalitis," Lieut. Col. Simon Flexner, M. C., U. S. Army.

TUESDAY, OCTOBER 14

Fourth Session, 9.30 a. m.

1. Report of Nominating Committee.

2. Election of Officers.

3. Addresses: "Some of the Earlier Problems Confronting the Medical Corps of the American Expeditionary Force," Cols. S. H. Wadhams and A. D. Tuttle, M. C., U. S. Army; "The Military Aspect of Base Hospitals," Lieut. Col. Gustavus M. Blech, M. C., U. S. Army; "The Care of Six Hundred Cases of Penetrating Wonnds of the Chest," Lieut. Col. Walter Fischel and Capt. Hugh McCullough.

1 P. M., Luncheon Washington University Medical School.

Fifth Session, 2 *p. m.*

In the Auditorium of the Washington University School of Medicine, Euclid Avenue and Kingshighway.

1. Addresses: "Modern Military Medical and Surgical Reconstruction in Relation to Vocational Education of Discharged Compensable Disabled Soldiers," Col. Frank Billings, M. C., U. S. Army; "The Importance of Physical Therapy in Military and Civil Practice," Comdr. William Seaman Bainbridge, M. C., U. S. N. R. F.; "Physical Reconstruction in U. S. Army Hospitals," Col. H. A. Shaw, M. C., U. S. Army.

Sixth Session, 8.30 *p. m.*

1. Addresses: "Morale—An Asset to a Fighting Force," Col. E. L. Munson, U. S. Army; "British Ambulance Trains" (Illustrated), Capt. Frank L. Pleadwell, M. C., U. S. Navy; "Observations on an Epidemic of Influenza in an Isolated Post of the A. E. F.," Maj. Alan M. Chesney.

WEDNESDAY, OCTOBER 15

Seventh Session, 9.30 *a. m.*

1. Installation of Officers.
2. Reports of Auditing Committee, Committee on Resolutions, etc
3. Unfinished business.

A COMMISSION AS AN ASSET

All values are relative, and there is a "good" only because there exists a "bad," which it transcends.

Also there exists in the scheme which governs our destinies a law of compensation. Sun follows rain and the delights of summer mitigate the months of cold and ice and snow.

When it became imperative that the world be made safe for democracy we closed up our accounts, told our patients that we would come back and cure them after the Hun menace was abated, and went off to ship or camp to change our customs, if not our profession.

We did this for reasons varying between the extremes of the lust for adventure and the mandates of the Draft Board, and, calculated in terms of arithmetic based on dollars and cents, we most of us made a sacrifice.

It is comforting, however, to realize that compensation is not all measured by coin of the realm—that there is pay for service other than that which can be entered on a deposit slip and handed in to the receiving teller.

We have moralized on this more or less editorially in past issues. Perhaps unnecessarily so, since it is presumably apparent to everyone that work with the armed forces was more than a duty to be done—was in itself an education which, as all true education, had a tangible personal value to each of us.

We got, out of our service for the country, experience, a broader view, new methods and a knowledge of conditions about which we had hitherto been uninformed. Even those of us who came back with sore heads and a grievance will admit that we know now how not to do it.

Aside from the loss of practice in our absence with the colors, of the fact that we must win back again the clientele which has drifted to strange gods while we were away—the fact that we have been colonels or captains has a fixed value in the post-bellum existence aside from being something which it is a satisfaction to have done.

We do not make this as a loose statement—a matter of our own personal opinion—but as the result of evidence from many who have been medical officers in service and have now reverted again to civil status.

A few days ago we were looking over a copy of the *Journal of the American Medical Association*. In the advertising columns, under the heading "Partnerships Wanted," "Locations Wanted," and "Situations Wanted," out of a total of 62 who advertised, 31, or 50 per cent, stated as a qualification that they had had service with the colors.

There is nothing to indicate whether these 31 came out from a commissioned status entirely content with conditions under which they served, but it is manifest that each of them believes that the fact that he took the oath of allegiance as an officer makes his services as a professional man of more value—renders him more desirable.

It is published testimony from many parts of the land as to the value of service, of the fact that even to have had a commission is a real and tangible asset.

J. R. C.

COMMENT AND CRITICISM

REPORT OF THE PROCEEDINGS OF THE MEDICAL VETERANS OF THE WORLD'S WAR AT THE FIRST MEETING AT ATLANTIC CITY, N. J., JUNE 11 AND 12, 1919

First Session, June 11, 1919

The first annual meeting of the Association took place at Atlantic City on June 11, 1919; the meeting was called to order by the temporary president, Dr. Hubert Work. He announced the appointment of the following committees:

Committee on Organization: Dr. John M. Dodson, Dr. Rock Sleyster, Dr. H. D. Arnold.

Committee on Nomination of Officers: Colonel Frank Billings, Dr. J. N. Hall, Dr. Cornelius Van Zwaluwenburg.

Committee on Constitution: Dr. Victor C. Vaughan, Col. F. A. Winter, Dr. H. L. Graves.

Committee on Membership: Col. F. F. Russell, Dr. A. T. McCormack, Dr. D. C. Brown.

The gentlemen named by the Nominating Committee were unanimously elected by the members present, between two and three hundred. They are as follows: *President*, Dr. Victor C. Vaughan; *Vice-President*, Admiral E. R. Stitt; *Secretary-Treasurer*, Col. F. F. Russell. *Trustees:* Col. F. A. Winter, Dr. George E. Brewer, Dr. James C. Perry, Dr. John M. Dodson, Dr. Hubert Work, Dr. Holman Taylor, Dr. Joel E. Goldthwait.

The new president, Col. Victor C. Vaughan, took the chair and addressed the meeting as follows:

The medical profession may feel proud of what it has done in this war. The draft boards were all supplied with one medical man at least. General Crowder has testified to the excellent work done by men on the local draft boards. There were stories afloat that men with glass eyes and wooden legs were passed by the medical men on the local draft boards. General Crowder has taken the opportunity to officially deny that any such things ever occurred. More than 32,000 men from civilian life came when their country called. Some 20,000 men acted on local and general boards. It is estimated, I believe, that at least 70,000 medical men out of a total of about 140,000 responded to their country's call. They are ready to do it again if the necessity arises.

It was my task, or a part of my duty, when the war began to urge young men to go to the British Army to serve, and I said to those young men at the time, "You cannot afford not to respond to this call," and they did so nobly, and I am sure that no one who has done so regrets it. I do not know exactly the number of medical men who were killed or died of wounds. The last time I went over the list in the Surgeon General's Office, which was soon after the armistice was signed, there were seventy

odd medical officers killed or died immediately or within a few weeks from wounds. The House of Delegates yesterday did reverence to these men by standing for a moment in silence, and I ask you to do the same.

We realize what the young men sacrificed financially by going into the Army. We older men made no sacrifice. Our work in a professional line was practically done; but the young man, five or ten years out of college, who had bought his home, still unpaid for, and had built up a good practice, sacrificed much. In the speeches that I made to these young men at the time that I was urging them to go into the service, I said, "You can expect no financial return from this; when you come back from the war you will live on the side street while the man who stayed at home will live on the avenue; you will be content, or must be content, when you have an opportunity to deposit a few hundred dollars in the bank of which the man who stayed at home is the director." In my own little town an amusing incident occurred a few days ago. Of course the best young men went, best professionally and best personally. A good lady who had employed one of these men said to him the other day: "Doctor, you mustn't think that we have forgotten what you did for our family, but Dr. Smith stayed at home and took care of my children when you were away and we owe him something." Whatever we may say, this is going to be the feeling. Now, I am sure, as I said two years ago, the time will come when there will be two grades of men in this country, not only in our profession, but elsewhere—the men who went and the men who stayed at home, and, whatever it has cost financially or otherwise, the men who went will have the consciousness of having done their duty and will be the winners in the long run.

The war has been of immense advantage, strange as it may seem, to the medical profession. Wars have frequently contributed much to medical knowledge. Look at the charts in the exhibits here in Atlantic City today and see the low place occupied, so far as the cause of death is concerned, by typhoid fever and other enteric diseases. It was my fortune to walk the hospitals in 1898 and see 20,000, more or less, of cases of this dreadful disease, while in the late war, with, I think, four millions of men under arms from our country, the deaths from typhoid fever and kindred diseases numbered only slightly above 200. This war has made us realize certain things which I must take a few moments to present to you. While the enteric diseases and many other infectious diseases have been practically banished from the armies of the world, our own and other armies, we are today without the knowledge necessary to deal with the respiratory diseases, either in prevention or in cure. This is a task which lies before us today, and I am optimist enough to predict that when the next war comes, if it doesn't come altogether too soon, we will be able to control these diseases to the same extent that we do the enteric diseases today.

We are to realize, gentlemen, that sanitation alone—improved water supply, sewage disposal, clothing, housing and everything of that kind—will not enable us to get rid of these diseases. We need further information, we need more research along these lines. The great Arctic explorer, Maude Stephensen, put up to me the other day in a private talk the following question. He said: "Suppose there was an island in the Pacific Ocean, inhabited by 100,000 savages who had never had measles or pneumonia, living in a savage state, and I should say to you, 'Go to that island; you can have all the money that you want, all the help, all the skill that the world can command, and put that island and its people in the most perfect sanitary condition, and when you get ready, I will introduce in a thousand places in that island measles and pneumonia. You are not to quarantine. 'How many deaths will you ave by the work that you have done?" I said, "Not one." And I believe that is

true. It is a question, apparently, today of immunity or increased resistance to these diseases. Fortunately, notwithstanding the epidemic of influenza and pneumonia, notwithstanding that our death rate jumped from August, 1918, to October, 1918, to nine times the former rate, the death rate in August was less than 5 or about 5 per cent of the annual death rate per 100,000, and it jumped to 47; notwithstanding that, we have come out of this war with the lowest annual death rate of any army that ever engaged in any war in recent times, in so far as we have any statistical data.

This organization, gentlemen, promises to be one of the most powerful in the United States, so far as the medical profession is concerned. We are all to work together for the good of humanity and for the advancement of the profession. I consider it the greatest honor that has ever come to me to be asked to preside over you at this, your initial meeting.

General Winter: Mr. Chairman and gentlemen, the committee appointed by Colonel Work to consider the question of the Constitution and By Laws for this Association is of the opinion that, in view of the fact that the Constitution and By-Laws preliminarily gotten together were very carefully devised in Washington with high legal assistance, that it would be appropriate and expedient that the Constitution as written in this pamphlet be accepted by the meeting here this afternoon as the document upon which we would work, at least for the time being. You will, of course, readily understand that, in the very limited time given to Colonel Vaughan and his committee, it was impossible to go to any very considerable degree into the ramifications of this document. Hence it is the opinion of the committee and it is so recommended by the committee, that this Constitution, as written here, be at least tentatively adopted, and I move you to that effect.

Motion seconded. Constitution adopted.

Mr Dodson (Committee on Organization): Your Committee on Organization were in some doubt as to what their field was, where the line might be drawn between Committee on Organization and on Constitution, but we were determined to get in the limelight somehow, and therefore we offer this report:

1. Inasmuch as one of the purposes of the M. V. W. W. is to offer opportunity to renew associations and friendships formed in the great war, it is recommended that:

(*a*) A chapter of this organization be provided for in each state, meetings of which may be held at the time of meeting of the State Medical Society.

Subsidiary chapters may be organized in the larger cities.

(*b*) That consideration be given by the officers to be elected at this meeting or by a standing committee on organization as to the desirability of arranging for special sections of the national organization representative of the several lines of service provided for in the membership.

(Signed) Rock Sleyster,
H. D. Arnold,
John M. Dodson,
Chairman.

Report adopted.

Colonel Russell (Committee on Membership): The qualifications for membership, as stated in the Constitution, provide that all medical members and medical examiners of Local, Medical Advisory and District Boards, officially appointed by the President of the United States, the Provost Marshal General of the United States Army, and the Governors of the various states, be qualified for membership. The Committee on Membership recommends one additional phrase, which would provide for admitting to membership in the Association those members who actually worked on the Medical Advisory Boards and District Boards but were appointed by the President of the Board, provided that they were vouched for by the Medical Aide to the Governor. In the early part of the draft, the members were all appointed by the President, the Provost Marshal General and the Governor. As time went on, there were some additional members appointed by the boards themselves. Now, if those members can be vouched for by the Medical Aide to the Governor, it is recommended that they be eligible for membership.

Adoption moved and seconded.

Dr. Winslow: Is there a provision to include the members of the medical profession of the United States who served in foreign armies. I cannot find such reference.

Moved that under No. 1 be added "And all American surgeons who served in Allied armies."

Colonel Russell: Mr. Chairman, may I propose an amendment to that? Section 3 now reads: "Members of the medical profession of Allied nations." I suggest that we cut out "Allied nations" and have it read: "Members of the medical profession who have been in the service of the Allied governments during this war." The Allied governments must vouch for these men, I understand.

Amendment voted upon and carried.

Report, as amended, carried.

Colonel Welch: . . . whether or not the Constitution is designed to include or exclude those who were not in the Army but who served in the Red Cross overseas. It is not explicitly stated whether the men in the Red Cross were in the war or not.

Colonel Billings: Inasmuch as there will be questions of this kind as to who will be eligible, who are not already mentioned in the Constitution, I would like to make the motion that this be referred to the Committee on Constitution and By-Laws. For instance, there are all of those members of the old Reserve Corps who didn't get into actual military service. Many of them were kept at home to teach.

They served the country, and there are many others, such as these Red Cross men; we can't take this up this afternoon, and it should be referred to the committee to report at some future time.

COLONEL VAUGHAN: We have adopted a Constitution and By-Laws. Speaking on the point of order, when the Constitution provides a special way of amending it, it is the only way it can be done except at any meeting by unanimous consent. If this meeting wishes by unanimous consent to amend that Constitution and By-Laws it can do so.

The Chair will remind you that the subject of modification by the house, that all of these amendments are out of order. The Constitution has been adopted and there is a way provided for amending the Constitution and By-Laws, and that way will be followed. So all these amendments, and even the report of the Committee on Organization, are out of order.

In the Medical Corps of the Army we have been exceedingly fortunate in having two most distinguished gentlemen and able medical men as our leaders. It was exceedingly fortunate for the medical profession and for the country at large that a man of General Gorgas' wide knowledge and scientific reputation was Surgeon General of the Army. When General Gorgas was retired, we were again fortunate in having appointed to our leadership a distinguished representative of our profession, who is present with us today, and I am sure that it would be highly improper to adjourn this meeting without a word from General Ireland.

GENERAL IRELAND: Mr. President and gentlemen, I am very glad to be here and meet you all. I am very glad that you are going to unite in an organization to continue this friendship which has grown in the last two years. It will be the greatest pleasure to me to assist you in any way possible in this organization. I don't know what I can say to increase the enthusiasm and good-will that exists here today, except that I believe it is a good thing for the men who have done such splendid work, and the profession has cause to be proud of the work it has done in the last two years—to get together frequently.

COLONEL VAUGHAN: The success of the medical profession in this country, the example set by certain men, the untiring devotion of certain men, I think that this body will be glad to recognize, and I should feel that I had not done my duty today and had not carried out your will if I failed to call upon one or two of these men. The great success of the Laboratory Department of the Army was one of the most phenomenal things that the medical profession has ever accomplished. When the war closed in 1898, when every camp in the United States was filled with sick, dying and dead, there was not a microscope or a

laboratory in any camp in the United States. In this war, from the very beginning, there was an excellent laboratory, well manned and well equipped, in each camp in the United States. We owe this largely to two men, and I want at least to have you recognize that fact. I am going to call upon Colonel Welch to say a few words to you.

Col. William H. Welch: Colonel Vaughan, Surgeon General, other members, I agree with all that Colonel Vaughan said in his opening address, and especially with what he said about the relative sacrifices of the younger and the older members of the medical profession. I, as one of the older members of the profession, regard it as one of the greatest privileges of my life to have had the opportunity to serve in the Medical Corps of the Army. I cannot claim to have rendered any conspicuous service, but it has been an opportunity which I cherish as one of the greatest privileges in my whole life.

I feel that this organization has a very great and somewhat varied purpose to serve. It will not be merely to keep fresh the memories of our experiences during the war; it will not be merely to bring together, important as that is, the results and the lessons which we have learned from this war; but I think it equally important that we should keep in mind the necessity of continuing preparedness. The state of the world is uncertain, but, however varied one's judgment may be on the future, I think all will agree that it is of the first importance that we should not enter another war, if it should come—we hope it may not—with any such sort of unpreparedness in the profession as a whole as we faced in April, 1917. I think one of the important functions of this organization will be to see that our profession is kept alive to this great demand, this patriotic demand, that suitable measures are taken in order that our medical students shall receive a measure of training in military matters, and that the members of the profession as a whole are trained to serve without that long period of apprenticeship which was required when we entered the war.

I recall, only three weeks ago, when traveling with Colonel Russell in France, that when journeying from Paris to Boulogne we stopped over at Etaples in order to learn something about the work which had been going on there in one of the laboratories. There was an assemblage of many hospitals—really difficult to find our way around—and we inquired of a British soldier how to reach this particular institution. I said to him, "How long are you going to remain here?" because there was apparently much more going on there than with the American forces where we had been. "Oh," he said, "during the duration of peace." His point of view—but something in it.

I think, therefore, that this is something we should keep in mind, that we shall see to it that the profession as a whole is more ready,

more informed as to the military needs than it was in the past. What would have been the situation if there had not been a nucleus of the regular Medical Corps of the Army to take the leadership when we entered the war. How helpless we would have been, and how little we realized our helplessness. The military game is something which has to be learned. It is to me, therefore, the greatest possible delight and privilege to have had this service and now to be a member of this organization, which I am sure has in it the possibilities of development and growth and influence which will be for the good of the whole country.

COLONEL VAUGHAN: Gentlemen, I believe General Winter has a matter which he wishes to bring up.

COL. F. A. WINTER: Mr. Chairman and gentlemen, I am not here altogether voluntarily, or entirely on my own initiative, to lay a proposition before you. I have been delegated as a member of the Executive Council of the Association of Military Surgeons by the President of the Association of Military Surgeons to speak to you for just a moment on a question which has arisen in our minds as being possibly appropriate this afternoon.

The Association of Military Surgeons, as many of you know, was organized in the year 1892, through the driving force of Brigadier General Nicholas Senn, of the State of Illinois. The Association has gone on now for all of this length of time—something like twenty-seven years—and it now embraces something like 9,000 members. It has a journal which is carried on regularly once a month and which, I think we may say without rendering the editor, who is present, unduly chesty, is a representative journal of military medical men. Furthermore, and a factor of the most material moment, the Association of Military Surgeons has in its treasury $25,000. Now what we proposed—as I say, on delegation from the Executive Council of the Association of Military Surgeons—is to invite this body which has organized here this afternoon to come into the Association of Military Surgeons lock, stock and barrel on a parity with the other members of the Association of Military Surgeons.

The idea occurred to us that there was going to be a multiplicity of these societies in America. I was talking to General Munson the other day—from the Morale Branch—and he told me this was being recognized. Now, without any disparagement in the world to the handsome spirit shown here this afternoon, which must be a very gratifying one; without casting the slightest disparagement on this organization, I don't see why we can't consolidate the whole bunch into the Association of Military Surgeons.

Now it will be easily possible to take every man who is provided for

under the terms of membership, as stipulated in the Constitution of the Medical Veterans of the World War, into the Association of the Military Surgeons. I would, therefore, look forward to the time when the Association of Military Surgeons, instead of having 9,000 members, would as a matter of fact have 9,000 members probably plus the 35,000 or 40,000 people who have been identified with us in the war and have enabled us to carry on the war.

It is you gentlemen from civil life who have provided the sinews that have carried forward this war. I submit this matter to you—present an invitation that you cast your fortunes in with us. If you don't do it, I shall expect to be a member of the Medical Veterans, of course, but I don't see any reason why we should have the two associations.

You will have control of the other organization exactly as you would have of this one. The plan would contemplate that in each city and each state there would be a subsidiary branch which would enable you to get together and fight the war together whenever you saw fit to engage in that particular pursuit. It would be a governing body in itself.

I have very great pleasure in submitting this proposition to you and, of course, it will be the decision of this body as to whether you wish to take it or not. Personally, with the most glowing interest in the great body of the profession who have been with us and the most ardent desire to see a consolidation of the activities of those gentlemen as a perpetuating institution for the benefit of the government services, I should be most delighted to see this result come about, and I submit it to you for your consideration and such action as you may be inclined to take.

Dr. Edward V. Delphey: Mr. President, I offer the following resolution for consideration:

Whereas, it seems altogether unnecessary and inexpedient to have a multiplicity of societies or associations for the same purpose; and

Whereas, there is already in existence an American Association of Military Surgeons which has the same purpose in view as has the Medical Veterans of the World War; and

Whereas, the aforesaid American Association of Military Surgeons has extended to this body an invitation to join and be amalgamated with them; therefore be it

Resolved, that the Board of Trustees of this body be and are hereby directed to take the necessary steps to effect such juncture and amalgamation; and that any member who does not wish to be a member of the American Association of Military Surgeons may on demand have his yearly dues returned to him.

Dr. Brown: Mr. President and gentlemen, I see present here today one gentleman who, with me, was one of those who organized the original Association of Military Surgeons, Dr. LaGarde. There are

very few of the men left who began and who placed that organization upon its feet. I can readily see a very vast advantage to this organization if it accepts the invitation of the Association of Military Surgeons for amalgamation with it, but, inasmuch as there will be a very great number of details to be arranged in the matter of accommodating this organization with its particular purposes, especially those of maintaining the memories of recent war, which memories have nothing whatever to do with the Organization of Military Surgeons, I think we might well adopt, or accept, the resolution which the gentleman has just presented and leave the details of the choice of what shall be the name of the new combined organization, its purposes and its methods of continuation, entirely to the Board of Trustees of this society. Of course there should be some means whereby the honor that has been achieved by the gentlemen who have taken part in this recent war should be passed on to the dependents of your men, just as in the Loyal Legion the honors that came to the men who were officers of the Civil War or the War of the Revolution have been passed on to the sons of those men. It would be a question as to whether it would not be better that the name of the organization here organized should be accepted and held in the place of the other organization, the Association of Military Surgeons. There would be questions in relation to acceptance of property, titles to same, etc., and, therefore, when we act upon this present resolution so recently offered, it should be with the giving of an extremely elastic authority to a board, probably the Board of Trustees already appointed by this organization, that they may organize the two societies into one, particularly looking after the welfare and future continuance of this organization. I second the motion offered by the gentleman.

Colonel Winter: As a member of both organizations, I naturally feel that I want to get them together, and I move you that, if it be the sense of this body, they "request the Board of Trustees to take as early action as possible on this question." (Seconded.)

A Member: Mr. Chairman, Article 13, Section 1, says "The Board of Trustees shall have control and management of the affairs and funds of the society." If the question of amalgamation can't be referred under Article 19, it seems to me it can be referred under Article 13, Section 1.

A Member: Mr. Chairman, "The affairs of this society" does not contemplate any change in this Constitution. It refers to the material affairs and not the Constitution.

Colonel Vaughan: I think that point is well taken. Gentlemen, the Chair will remind you that this is a matter which will involve a change in the Constitution which has been adopted, and it will be

referred to the Board of Trustees in accordance with Article 19. It will come up a year from now for discussion.

Colonel Vaughan: Is there any desire to have another meeting before we leave Atlantic City? To what time shall we adjourn?

A Member: Mr. President, I would like to ask if women physicians are eligible for membership in this Association who were not commissioned but did good work at home and abroad—child welfare, etc. I have in mind ladies who did that sort of thing.

Colonel Russell: Contract surgeons are eligible.

A Member: These are not contract surgeons.

Colonel Russell: Then they are not eligible. (The question was referred to the Board of Trustees.)

Dr. Work: In order that certain matters that are not clearly understood and certain new matters that the members have not thought of be worked out to the satisfaction of all present as nearly as possible, I move you that when we adjourn that it be until 4 o'clock tomorrow at this place and in this room. (Seconded.)

The meeting adjourned.

2d Session, June 12, 1919

The meeting, which was well attended, was called to order by the president, Col. V. C. Vaughan, who called upon Surgeon General Ireland.

General Ireland: Mr. Chairman and gentlemen, the medical profession of the world has been on trial now for nearly five years and we have made good, and I think it is perfectly fair to say that the medical profession of the United States has given a better account of itself than that of any other country.

We have done this under conditions that are almost unfair. We are not a military nation; our people will not provide for the emergency of war in time of peace. Yet when war is declared there is no nation on the face of the earth which demands such a high degree of care for its soldiers as do the people of the United States.

When this war started two years ago we had less than 450 officers in the regular Medical Corps and 1,600 in the Reserve Corps. Now those of us who had given some thought to the responsibilities of the Medical Department in time of war were pessimistic as to whether we could get a sufficient number of doctors quickly enough to meet the emergency before us.

A war of the present day runs into millions of men. In fact the whole nation is mobilized, and it takes about 10,000 doctors to care for every million men placed in the field.

The medical profession met the situation in a splendid manner. My understanding is that there are not to exceed 150,000 registered physicians in this country. A great many of these men are not practicing their profession, and many others are beyond the military age. Yet on the 15th of November, 1918, nearly 35,000 doctors had been commissioned in the Medical Corps and were in active service. This does not take into consideration the thousands of doctors who were assisting the Provost Marshal in executing the draft act and in performing other essential duties necessary to the successful carrying on of the war. It is fair to say that at least 50,000 doctors were giving all or the most of their time for war purposes the middle of last November—about a third of the registered physicians of the country and a little less than half of the actual number of doctors eligible for military service.

They brought with them in this new service a perfectly splendid spirit. One of the finest things I ever saw was the spirit these men brought with them to France. They brought with them into the Medical Department a professional ability of the very highest order. No soldier was ever protected from diseases and cared for when sick or wounded as the American soldier has been cared for during this war.

This was the work of the medical profession of this country, and I wish the line of demarcation which some prople try to make between the professional man in civil life and the professional man in the Army could be obliterated forever. There is not the slightest difference between them. I have always looked upon the medical man of the Army as the representative of the profession from civil life. We simply cast our lot with the Army, which is not attractive to a great many physicians. A physician gives up a great deal when he goes into the Army and leaves behind him everything, so far as competency is concerned, except a fair living. This, I am sure, many of you who have been in the service in the last two years have found out. Moreover, it isn't worth while for any physician to go into the Army who isn't perfectly willing to adapt himself to army life.

We are all, however, of the same profession, and the medical profession of the United States has done this splendid piece if work for the country and deserve well from their fellow-men.

The Medical Department had to be expanded enormously in a very short time. Many new problems had to be met at once. The organization which was built up worked well as a whole, but no one believes it was perfect. There were shortcomings in many places, and this should not be a source of surprise because we had never had to meet problems on such a tremendous scale before.

I think it is the business of the profession to complete some organi-

zation so that we will be brought closer together and be able to discuss and rectify the errors made in the past. I am a thorough believer in constructive criticism. It is through such efforts that the shortcomings of the past two years can be rectified and an organization built up which will do much better in the future. I think this great body of men, who have done such a splendid piece of work in the last two years, should keep up the friendships and traditions which have been started during this war. And the organization which is built up should be an active one. You know many of us are getting along in years, and someone else has to be prepared to pilot the profession through the emergencies that may come in future years. Just how you are going to do this is left to you. I am with you in any way you want to run your organization.

The suggestion was made here yesterday—the invitation was presented by General Winter—that you come into the Association of Military Surgeons. It rests entirely with you, gentlemen, whether you do this or not. The Military Surgeons, as you know, is a National Guard organization. Seventy per cent of the members of the organization belong to the profession in civil life. The members from the Army, Navy and Public Health Service are almost a negligible quantity. The organization has an official publication which, it seems to me, should be the mouthpiece of this organization, for the two bodies have about the same object in view.

I am perfectly willing, and only too glad to have the privilege of assisting the organization of the Medical Veterans of the World War in any way I can. I think they should be organized. I think it would be a calamity if the traditions of this great body should disappear, if we should not take advantage of the present time to perfect an organization so that the medical profession of the country would never again be caught unprepared to meet an emergency.

Dr. Dodson: Mr. President, I think we all feel that a multiplicity of organizations is undesirable and that if some sort of merger can be effected between the organization which we formed here yesterday, or which had been formed before but which we indorsed, with the older one, it would be advisable. But, without going at all into the merits of the question or the method by which it is to be effected, I would like to call attention to the fact that it has gone beyond us. This body is not the proper body to order the Board of Trustees to do this. We are a small group of more than 1,200 men who are members of this Association today. I personally have solicited a thousand men in Illinois to become members of this Association, and a large number of them have joined. It would not be fair to them to abandon the one thing that

appealed to them, and that is the name and the appeal which it makes to them as a memorial of the great war, an ackowledgment of the fact that they were concerned in one way or another in this war.

I should like to move, therefore, Mr. President, an amendment to this: That the Trustees be directed to consider this question, but they do not be ordered to make this merger; for, while under our Constitution the Trustees are given this authority, I question very much whether that Constitution should not be so amended by the Trustees as to give the full membership of the various state organizations which will be effected a voice in so vital a matter as this.

Amendment seconded.

Dr. Costell: Does the membership in this organization include men who served in other capacities than on the draft boards, and will there be provision in this organization for a state organization, or will the state organizations be independent of the parent organization?

Colonel Russell: State organizations are provided for.

Dr. Costell: Organized by the National Association or by the states?

Colonel Russell: The initiative can be either way. If the state does not of itself organize, the National Association will try to have one organized, but the states will have the power of making their own organization.

Colonel Billings: Mr. President, I feel like substituting an amendment. This is a new organization. The possibilities of the membership are great, and we don't know what the attitude of many men who are eligible may be. Should we at this time take action which will practically change the whole idea which has been presented to many members? As it happens, I am a member of the Association of Military Surgeons. I agree with those who have spoke and believe that the lesser number of organizations would be better and, provided a proper fusion can be brought about, I am strongly in favor of it; but do not believe that at this time the present members should take action which may embarrass the future membership—that is, of obtaining the members. We are just starting out on a propaganda to get members, with a possibility of 50,000 members. We only have 1,200, and we should in the next year attempt to secure as nearly the 50,000 as may be possible, leaving it to the final action of that body as to whether they desire this fusion, and then the question of details of the fusion may be left to our Trustees. I am greatly in favor, sir, of the amendment to the motion.

Colonel Winter: Yesterday I was made the mouthpiece, the proponent, of this plan to consolidate the two organizations. I have

learned a good deal since I have been here in Atlantic City by rubbing up against the volume of men I have met here and who have illuminated me upon a good many points. I am quite in concurrence with what Colonel Billings has stated. The plan that he outlines, the general survey which he gives, has my most hearty concurrence. I believe that the organizations could be fused without any trouble, but, as Dr. Dodson and Colonel Billings have said, I think it would be better to take a little time and ascertain the wishes of the men who have come into the organization.

It was moved and seconded that the motion to amalgamate the two societies be laid on the table.

Dr. Arnold: Mr. Chairman, I do not know whether I can speak exactly on the point or not, because I have a number of doubts in my mind I would like to have cleared up. I would like to know, in the first place, what power this amendment, or the motion itself, leaves in the hands of the Association, and how much it removes from the hands of the Trustees, who are at present unnamed. I would like to know just exactly what power these Trustees have. According to the ruling of the Chair yesterday, the Trustees have sole power over all the affairs of this Association. I think there should be a full and free expression here, both as to whether we shall amalgamate and also as to whether the Trustees are to have this power—whether we shall leave all this power in the hands of the Trustees. "The Board of Trustees shall have control and management of the affairs and funds of the society." At present this Association has been comparatively inarticulate. There are comparatively few people here, compared with the whole number of men, who have spoken, and I think it will require a great deal of discussion, free and impartial, as to the merits not only of the immediate question in hand, but as to the reasons for leaving all of this authority in the hands of a very few, so that amendments cannot be made by the organization as a whole, but must be made by the Trustees. I have no prejudice in this matter as to the union of these two organizations because I belong to both of them. I am very strongly in favor of this organization, and I hope I have been—I have intended to be, at least—a loyal member of the other, but I really think that every man in this organization ought to have a chance to speak upon this offer. There should be some way, if it is the consensus of opinion, by which the whole membership as a body can have some control over its own affairs. I therefore move that—

The Trustees be instructed to consider the feasibility of a union of the Association of Military Surgeons with the Medical Veterans of the World War and to report at the next annual meeting of the organization.

The motion was seconded.

Dr. Dunn: Mr. President, it occurs to me that one of the things we must not lose sight of at this moment is that sentiment is playing a very large rôle in the organization of this particular body; that, after all, while we may be organized for scientific purposes, altruistic purposes, the determining factor with a great many men in joining this organization is sentiment, and we must not lose sight of that. The union at this time of this organization and the Military Surgeons, it seems to me, will remove at once a large part of the sentiment which is going to control and influence a great many men to come into this organization or into the combined organization. Every man has had an opportunity to join the Military Surgeons who has joined this or considered joining it, and the absence of sentiment in connection with joining the Military Surgeons has probably made them slow to join it. The present sentiment has made everybody determine to ally himself with this organization. It seems to me that, not only for this organization but for the Military Surgeons, if finally amalgamated with it, it would be far better for us to form as an independent organization until we have gotten all the recruiting value of sentiment and then there will be plenty of time, it seems to me, to consider the amalgamation of the two organizations.

Dr. Dunham: I think there is no question but what we are perfectly safe in leaving this matter to the Trustees to submit at the next annual meeting. I feel, sir, that there is going to be an organization of men who volunteered for the service during this trouble. There is a general feeling among all of us—Dr. Dunn said sentiment. If anything is done to kill that sentiment, we are certainly going to have another organization—no question about that in my mind at all. There will be no question of that, sir, in the minds of the Board of Trustees. Now if they are going to be empowered to consider this from all sides and report to the next meeting, I think we will have no trouble at all in leaving the matter there. I, therefore, move you the previous question of the motion and the amendment.

Seconded.

Amended motion voted upon and carried.

A Member: I move that each member of this Association be constituted a committee of one on new members and be requested to bring in as many members as possible before the next annual meeting.

Dr. Brown: I hold in my hand the badge of the American Medical Association, but, above, the little bar which makes the pin at present the insignia of membership in this organization. We can readily perceive, those of us who have had some acquaintance with the fine arts,

that this insignia was designed neither by Leonardo de Vinci nor by Michael Angelo. It is perhaps very appropriate for its purpose temporarily, but those who have been reading the mystic symbols inscribed across the top of it are not decided whether this means "many very witless women" or something of that kind, and, outside of any attempt at humor, and as one who I may hope has some repute for appreciation of things beautiful—not my hair, but things outside of that—I would consider that the psychological effect of this badge is not one that makes the purpose which it symbolizes particularly attractive to most individuals. I am trying by this camouflage of language to say that this thing is not at all appropriate as an insignia for men who are attempting to say that they have been patriots, and therefore I move that the question of a badge for the Society be referred at this time to the Board of Trustees with power to act, so that there shall be a badge that shall be appropriate and in harmony with the high purposes of this organization, the sacrifices, personal and national, that it symbolizes, and that all of us may wear without the suspicion of being classed among the Many Very Witless Women.

Motion seconded.

A Member: I would like to rise to a question. Article 13, Section 1, says, under Trustees, "The Board of Trustees shall have control and management of the affairs and funds of this Society." I ask whether the Trustees have not this power already given them. I merely make this point because they apparently have unlimited power.

Dr. Brown: It is true that we may refer this question of the badge, which I do not by any means consider to be a small matter. It is of the very greatest importance to me. If we are to be a society that is to be recognized and respected throughout the country, for we must be, it is necessary that everything that goes with this organization should be of the very highest character, nothing cheap, low, mean or nasty about it. In referring this question of a badge to the Board of Trustees, personally I believe that it is best to put that problem, a very important one, I assure you, in the hands of a few men who shall have full power to employ such talent, artistic and otherwise, as shall produce an emblem of which we may all be proud, and I believe we may very safely pass over this duty to the very honorable gentlemen who were nominated yesterday as our Board of Trustees.

Motion carried.

Colonel Vaughan: Lest we think the Army, made up as it was of both regular and volunteer civilian men, has won the whole war, I want to ask a man who sits before me, whom you elected to the office of vice-president yesterday, who has not been introduced to you, who repre-

sents another arm of the service, to say a few words to you. Admiral Stitt!

Rear Admiral Stitt: Gentlemen, I thank you very much for the great honor that you conferred on me, and I can only say in connection with the Navy during this war that it has been impossible for us to say where there was a regular and where there was a volunteer. In inspecting our hospitals, etc., I have frequently come across one of the departments of the hospital and would be struck with the magnificent manner in which it was being run. I would ask some questions and find that this man had only entered the Navy from civil life a few months before. It was simply out of the question for us among the great mass of men in the Navy to tell who was volunteer and who was regular—all just the same.

There is one thing that I think should be understood by the profession. The Navy has a certain method of promotion. Everybody steps together in the Navy, and we all have to follow the line. When a line officer is promoted lieutenant, each "running mate" of that line officer, and by that we mean the men who entered one day after that (all staff corps follow the line one day), is also promoted. Everybody in the Staff Corps of the same date as that line officer is promoted as the line officer is, so that it is out of the question, even though a man might have tremendous ability, to do anything but follow the general rule all through the Navy, that he goes up according to his "running mate," as we express it.

There were some exceptions in connection with units entering from the Red Cross, where the Red Cross unit consisted of five medical officers, one surgeon, one internist, an ophthalmologist, an X-ray man and a laboratory man. These units were formed with lieutenant commander rank for the medical man and for the surgeon, and lieutenant or junior lieutenant rank for the other members, according to age. Of course, in these instances, the hard and fast rule didn't apply, but with this exception, everybody in the Medical Corps of the Navy, whether he was called "regular" or in the Naval Reserve, went according to the line officer; so that, if some people did not seem to be promoted as rapidly as their merits would justify, it was simply the system.

Colonel Billings: Mr. President, you stated as one of the reasons for calling this meeting this afternoon that there should be a little freer discussion of the purposes of this organization, and that must be considered, in some degree, the question of how we are to proceed in the propaganda of organization to influence membership, the methods by which we will proceed with the organization of the state constituencies. I think we must have propaganda, and some of us who have thought

about this since it was first organized have discussed it to some degree—the purposes of it. As it happens, those who are eligible to membership have had an opportunity to serve in one capacity or another in the war. To begin at the inception of the induction of the man into the service, the medical members of all the draft boards and the advisory boards and the appeal boards had an opportunity that few men have to examine a large number of young men of a certain age; they had a wonderful experience in finding disqualifications. We recognize they did a good work. They rejected an average of 29 per cent of all that appeared before them from six millions during the whole period of the draft, and rejected them because they were either mentally or physically disqualified. They must have studied the men and found many remediable defects, and they set the machinery in motion to have those defects removed, not necessarily to qualify them for the Army but to qualify them for a continued economic citizenship.

Then came the medical boards in the camps, composed of temporarily commissioned men with some of the regular corps, and they again had a big experience and rejected an average of about 9 per cent of the men who had escaped the draft boards.

Next we had a lot of men in the camps who gave special training in the depot brigade and convalescent centers, and they have learned much.

Then we have the men who gave the special training on the other side.

Finally, we come to the clinical side of the experience, the men on this side in the hospitals, where the greater part of the work was medical, and the really wonderful development of military surgery in France in which many of them have contributed important additions to our knowledge.

That is the experience of our whole group of men, and the experience of each one is of great value. If we are going to have this organization simply for sentiment, that we meet together once in a while to swap stories about the war, it isn't going to last long. But if we have a purpose in view, to renew our acquaintance, talk over this situation and try to make practical application in civil life and for future use for the Army, if we have another war, the benefit that this experience has given us, then there is a real purpose in this that will make it last as long as we last and to the men that come after us, and I think we ought to get something of that kind particularly to the men in the states who have not been here to listen to this. Perhaps we have representatives among the members already here who could meet together for each state and who could agree today or during this meeting that they are going back home

as the nucleus of a new formation in their states. It seems to me that, unless we do consider these things to some degree at this time, we are going to scatter and it is going to take a long time before we finally get the purpose at work.

Dr. Dodson: Along the line of what Colonel Billings has said, it seems to me there are many possibilities of this organization in co-operation with other similar organizations. Two or three months ago there was organized in St. Louis the American Legion, a large organization of the men who were in the war, including privates and officers. Only a few days ago there was organized in Detroit the Officers of the Great War, and it seems to me that all together those represent an enormous body of citizenship who have great ideals and ideas which together could make a tremendous force for good in this country, and I think the cōoperation of those organizations through committees, etc., would further the objects which we have.

Dr. Shelan: I would like to offer an idea in order to stimulate membership for the young men. This organization must be for young men to make it successful, I think. The young men are, after all, the ones who are going to comprise the personnel. As was said yesterday, the young men are the ones who have sacrificed. In no place in the United States is there one effort made to help the doctor who has been in the Army to get back on his feet in the medical service—absolutely nothing in the way of clinics for men. No place do I know of where a medical officer is assisted to regain the work he has lost. Because many of us have done nothing but hunt the elusive cootie, we have lost a great deal in medicine. We have gained in other ways, but have lost in medicine, and no effort is made to help us. I would make the suggestion, that this board formulate some plan whereby the boys who are returning in the near future can be offered, in New York or in some other great center, an opportunity for regaining the work they have lost, and I am sure that would do a great deal to eradicate the dissatisfaction which many of them feel, and it will be a permanent chapter of their whole life.

They see newspapers with great headlines about what heroes they are, and yet nothing is done for them, and I think this is the organization which should do something for the young men who are coming back, and the time to do it is now.

Colonel McLean: We don't need much propaganda to organize the different states. I fortunately belong to the same state as our worthy president. I know all those who were in the war overseas are only anxious to organize, but, as yet, there are a number who have not returned. They have talked this over informally. As soon as they return, we will have an organization, probably 90 per cent of all those who were in the service belonging to that organization. They are anxious to belong.

Someone said something about the way he was received when he came home. I think probably there is something in it, but I assure you that is very temporary, because I believe as soon as we have those state organizations that the people who belong to these organizations will control those matters and control those clinics, and the other fellow will have to pay to come in when we get ready.

We have two great armies, the "regular" and the "irregular." I have belonged to the "irregular," and yet have a great respect for this "Regular Army." I have found them very gentlemanly, very courteous, very polite. These men started out as we did. This was as new to them as it was to us. They knew something about the Army and the red tape, which has been pretty well wiped out. I feel that there is no corps or branch in this Army, including the "irregulars," that did as great a service for their coutnry as the Medical Corps, and when this Medical Corps joins with this organization I think we will have a great, powerful body.

Dr. Brown: I am one of those who have been stamped with the red rubber stamp as being too old to serve, although I had been in the Medical Reserve Corps before the joining of issues of this country with those abroad. I have watched the course of events through the medium of many languages, many newspapers, and through personal contact and in personal touch with men speaking five different languages in my own city. No one can come quite so close to another person as he who speaks that other person's language. My city is Milwaukee, the city that is dishonored by Victor Berger. Our city merited to a great extent, in spite of the camouflage of newspapers to cover up our ulcers, the scorn and suspicion that existed against it throughout the United States, owing to the undoubted evil influence of our large foreign population; I will not speak of any particular group. Most of these men did not mean to be unpatriotic to this country. They merely did not understand it. Those of us who worked on the draft boards during the first five or six weeks in the effort to get the men together had occasion to handle numberless cases of malingering that were merely the result of fear and misunderstanding on the part of the men appearing before us. To such of those men who spoke but poor English as could be approached in their own language, an explanation removed a tendency toward resistance of the draft, and through my experience on the board there I came to the conclusion that there is no class of men in the world that holds in its hand the power for stimulating patriotism among those who have come across to this country to become citizens as does the medical man. We should realize that possibly we are the most powerful influence in this country toward stimulation of ideals

among the uninstructed that shall make patriots of them. We come into their homes; we touch their hearts at the moments of greatest emotion; we are their most intimate confessors and to us come the secrets that never are whispered through the door of the confessional. While all that Dr. Billings has said about sentiment is absolutely true, yet we have in our hands—this great body who have saved and sacrificed—a power for good, a power for elevation of the country, greater than that of any other body, and that should be one of the fundamental purposes and one of the unsentimental aims of this organization.

Colonel Billings: Mr. President, will you not instruct the members from the different states that they should get together and form a nucleus during this meeting?

Colonel Winter: The question touched upon by General Ireland in his talk to our assembly here this afternoon, which contemplates the use of the Journal of the Military Surgeons as the organ of this body, was, I think, a very important one. We must have some means of circulating our proceedings and getting the propaganda going, and that journal has a circulation of 8,000 now, and I think we can influence the editor sufficiently to get him to put that into the journal and circulate it. I think that should properly come before this body. Mr. Chairman, upon the insistance of my friend, Colonel Billings, I move that the Journal of the Association of Military Surgeons be designated as the official organ of this society for the time being, in any event.

Colonel Russell: May I suggest that the motion be so worded as not to exclude the use of any journal in addition to that of the Military Surgeons. So far, the American Medical Association's journal, for instance, has been very kind, considerate and helpful in giving whatever this Association had to offer to them the widest publicity. I think we will need this publicity, and that, if this is so worded that we can use all journals in addition, it would work perhaps better in the long run.

Colonel Winter: I am perfectly willing to accept that if Colonel Russell will supply the verbiage.

A Member: I would like to inquire if there is anyone here to speak for the Military Surgeons, that is, for their publication. It is possible they don't want us, and I would like to hear from somebody who really can speak for the publication.

The President: I may say that the very able representative, the editor of The Military Surgeon, is present, and I will call upon Colonel Church to say whether The Military Surgeon is willing to act as the official organ of this body.

Colonel Church stated that it was perfectly practicable to carry on The Military Surgeon, the official publication of the Association

of that name, as the representative publication of a society formed by the amalgamation of the M. V. W. W. and the Association of Military Surgeons.

Dr. Dodson: Colonel Russell's suggestion is very important. If the journal of the Military Surgeons is going to be the sole organ, it would involve the subscription to that journal of everyone who joins this organization, or else they could not read it. It is important that the dues be nominal. We want to make the strongest kind of an appeal to every man who was in the war. I understand it was in the minds of those who conceived this organization that the organized profession, the American Medical Association, or the several state societies could without any expense to themselves provide the meeting places, and it will relieve this organization of practically all expense. In that way we shall be able to secure the members to whom a considerable membership fee would be a real bar at this time. If, later on, when the organization is in full bloom with a large membership, they elect to increase the dues and proceed on a more elaborate scale, that is for them to decide.

Dr. Brown: While we are in process of organizing a large association, it seems very important that we should have some organ to reach all of the profession who are interested. As Colonel Russell has said, the *Journal of the American Medical Association* has been open to us and has been used, and I am in hopes that this might be left to the Trustees to take under advisement and use whatever journal may seem best in their judgment for promoting the welfare of this organization.

Dr. Dunham: I take it that is an amendment to the motion before the house. I second it.

The Board of Trustees will meet at the Hotel Statler, St. Louis, October 13, 1919, to consider the subjects which have been referred to it for consideration by this meeting and to decide upon the date and place for the next annual meeting of the society.

Frederick F. Russell,
Secretary.

New York, *August* 31, 1919.

The Rockefeller Institute has received the following letter from the Surgeon General of the United States Army:

Office of the Surgeon General,
Washington, D. C.

The Director and the Trustees of
The Rockefeller Institute for Medical Research,
66th St. and Ave. A., New York, N. Y.

Dear Sir and Gentlemen:

During the war which is now happily past, your Institute proved to be one of America's strongholds. I am informed that from the beginning to the end of hos-

tilities the entire institution was placed by you at the disposal of the War Department and that you did work of the greatest value, not alone for the Medical Department but for the Chemical Warfare and Air Service; that your hospital as well as your laboratories became in effect as much a part of the Army as the hospitals and laboratories established by the War Department in our cantonments.

I have also been informed that this great work, extending over the whole period of our participation in the war, was paid for entirely out of your own funds, and was without further support from the Government than the routine payment of salaries of such members and assistants of the institute as became part of the Medical and Sanitary Corps.

I thank you for your work of patriotism and your generosity in placing so fully at the disposal of the Medical Department your great and productive facilities for research, for teaching, and for the care of the sick.

Very sincerely yours,

(Signed) MERRITTE W. IRELAND,
Surgeon General, U. S. Army.

CURRENT LITERATURE

Report on Medical and Surgical Developments of the War, by William Seaman Bainbridge, Lieutenant Commander, U. S. N. R. F. United States Naval Medical Bulletin. Special Number. Washington, Government Printing Office. January, 1919.

Commander Bainbridge states in the foreword of his interesting and valuable report: "This report comprises observations on the western front and in England during December, 1917, and the first six months of 1918, made pursuant to the instructions of the Surgeon General, United States Navy. For purposes of comparison, there have been added certain data obtained while in Germany during the autumn of 1915.

"In making the survey, the following objects were kept constantly in mind:

"1. To record the surgical lessons of the present war based on the experience of our allies.

"2. To secure anything likely to be of value to the United States Naval Medical School, Washington, D. C., or helpful in the preparation of medical men and hospital corpsmen for active service."

A somewhat different field is covered in this report than in the one made by Commander A. M. Fauntleroy, U. S. N., in 1915.

The report is divided into the following sections: Treatment of War Wounds by the Allies; Treatment of War Wounds by the Germans; Developments of War Surgery; Trench Fever; Care of Wounded from Firing Line to Convalescent Camp; Reeducation for the Disabled; Conferences of Surgeons; Auxiliary Forces; Miscellaneous; Recommendations; Technical Instructions for Impending Military Activities; Report of Technical Advisory Council; Base Hospitalization and Surgical Measures for an Attacking Army Corps; Cartilaginous Crainioplasties.

Under the heading, "Treatment of War Wounds by the Allies," the author discusses wound suture—primary, delayed primary, secondary—Carrel-Dakin treatment, other methods. The following are his conclusions in regard to primary suture:

"In justice to the method of primary suture, it should not be attempted in very large wounds with irregular tracks, where there is extensive shattering of bone, or in injuries dating back more than half a day or so (twelve to eighteen hours at most). In fracture cases, the importance of complete fixation and immobilization from the earliest possible moment can not be overestimated."

"The advent of primary wound suture, representing as it does a wonderful economy in time, money, and material, has brought about a striking change in surgery. Formerly, even after the deplorable stage of overwhelming septic wound contamination was past, a long time was required for the repair and cicatrization of wounds which healed but slowly under laborious aseptic dressings. Before the application of at least secondary wound suture had become a reality, large numbers of wounded soldiers had to be evacuated before their wounds were properly closed. The introduction of primary wound suture has greatly simplified modern wound treatment, which now consists essentially in passive supervision of the repair process, without dressings. The suture threads are removed on the tenth to the fifteenth day. At the end of three weeks, the patient is evacuated to the base hospital, or discharged on leave, according to the gravity of the condition."

"The suture method was gradually reached by Lemaitre in July, 1915, after successive phases of nonintervention, free exposure and surgical purification, complete

excision of the entire wound track, fixation of microbes by means of iodine, and Carrel's method of multiple instillation. The original technique of wound suture has been considerably improved in the past three years. Filiform drainage by means of silkworm gut, removed in three or four days, is recommended on the basis of favorable experience. Minute asepsis and scrupulous hemostasis are indispensable, and radioscopy or operating on the radioscopic table are helpful adjuncts. When performed by experienced surgeons, primary closure by suture constitutes the ideal modern treatment of war wounds. The method needs no defense, for it is its own best vindication. Lemaitre aptly calls it a worthy daughter of French surgery, destined to live and prosper."

The description of the Carrel method is very good and is well illustrated. The following are the closing paragraphs of that section:

"While claiming brilliant results and supported by eminent surgeons, the Carrel-Dakin treatment is opposed by surgeons just as eminent. Thorough wound cleansing, with immediated suture, is held in high esteem and is undoubtedly the ideal method for treating many cases received at a very early stage. The use of other antiseptics besides the hypochlorites and the chloramines, either in conjunction with the Carrel method of instillation or without it, is also credited with successful results. Certain excellent authorities with large experience condemn the use of all antiseptics on the ground that they damage still further the injured tissues and contribute nothing to the healing process or the prevention of infection."

"The failure of so many able and honest men to agree upon a uniform method of treatment suggests the suspicion that each has hold of a thread of the truth but does not perceive the whole, which is that while much depends upon the sort of wound and the period when it comes under treatment, more depends upon the judgment and skill of the surgeon in first selecting the proper method for each particular case and then applying it."

"Personal observation in the war zone of the various modern methods of treatment, and the excellent results accomplished by many of them, leads me to accept the judgment of a growing number of surgeons that, while most of these methods have definite fields of usefulness, none of them is a panacea. The revival of the sixteenth century practice of immediate wound closure, with thorough debridement, is of undoubted value, and there is reason to hope that it will not again be relegated to the limbo of forgotten things, requiring rediscovery in wars to come. Meanwhile, the Carrel technique has come to stay, as through its employment certain great truths have been revealed. Asepsis, whenever possible, reinforced by antisepsis as required, is the keynote of success. The type of the antiseptic and the extent of its employment may be definitely determined by the future, but at present they are largely matters of individual opinion and preference."

Other methods of wound treatment described and discussed are: Hypochlorous acid preparations—eusol and eupad; salt pack method; dichloramine-T; magnesium sulphate; bipp—bismuth subnitrate or subcarbonate 1 part, iodoform 2 parts, paraffine in quantity sufficient to make a soft paste (Rutherford Morison's method); flavine; crystal violet and brilliant green; hypertonic solutions (lymphagogic agents); sunlight treatment of infected wounds; phenolization and embalmment of septic war wounds (Mencière's method); electricity; oxygen and ozone in war wounds.

The report gives some interesting information regarding the treatment of war wounds by the Germans, from which the following is quoted:

"The wound treatment then in use (1915) consisted in early long incisions, free drainage, and strong antiseptics, with invariable early splinting of fractures and immobilization of wounded parts. Their expert surgeons were stationed well up

in the forward areas, so that they could decide what was to be done in each case. This method gave excellent results, since it enabled the wounded men to have the best advice when it was most needed. Severe abdominal wounds and head injuries were rarely moved back, and early treatment was instituted at the front in all cases in which it was thought advisable."

"In Germany, no one method of controlling wound infection seems to have been adopted to the exclusion of competitive procedures, as on the side of the Allies, where the Carrel-Dakin method of wound treatment has been so largely adopted. Although irrigation with dilute antiseptic solutions is employed by German surgeons, opinions vary widely as to the value of antiseptic agents. Irrigation with hydrogen peroxide has been extensively used in their military hospitals and is claimed to be especially efficacious in the treatment of infected fractures."

"Various chlorine-containing substances have been in use since early in the war, calcium hyperchloricum having been perhaps the most extensively employed. This has been used in a 1 or 2 per cent solution for bathing and irrigating wounds or, in combination with animal charcoal, magnesium sulphate, and bolus alba, as a dusting powder. In January, 1917, the *Correspondenz-Blatt fur Schweitzer Aerzte*, a Swiss periodical published in the German language, in an abstract from French original sources, brought the Carrel method of treating infected war wounds to the favorable attention of its readers."

"Other antiseptics advocated by German surgeons include Karlsbad salt; Leukazon, a mixture of equal parts calcium perbolate and talc; pellidol, a substitute for scarlet red; liquid tar, etc."

"In opposition to the antiseptic method of wound treatment, and in anology with the physiological lymphagogic method indorsed by Sir Almroth Wright, some German writers on early wound treatment at the front have proposed the use of nitric salts, which on coming into contact with organic substances are at once reduced to nitrous salts. The object aimed at is to increase the hyperemia in these invariably infected war wounds and to produce a free flow of lymph."

"For fixation of the extremities in fracture cases, German surgeons make use of Cramer's wire splint and Volkmann's T-splint, femoral fractures being usually treated with extension apparatus. Plaster bandages are considered as unsuitable where a frequent change of dressings is required."

"Repeated plastic operations on the mouth and nose are recommended in the treatment of glancing gunshot injuries to the facial region. Soldiers with injuries to the jaw are transferred as soon as possible to the dentist for orthodontic treatment."

"Germany has given considerable attention to the after care of the wounded soldier, with a view to returning him to the ranks if possible, or, if he must be sent back to civil life, making him self-supporting and not a burden to the community."

"An interesting fact, possibly bearing on economic as well as surgical conditions, is that in 1915 and 1916 sawdust was being used as a dressing for many wounds instead of cotton. This was called 'scobitost.'"

The writer gives the following quotations from a summary of the observations made by Dr. H. M. Richter, of Chicago, who was for six months in 1916 in charge of a German base hospital:

"Carrel's treatment has been successful in relatively few hands. The numerous details to be observed in the preparation of the solution and its application probably offer an insuperable obstacle to its general use."

"The open treatment of infected wounds forms the simplest and most convenient method of handling patients in large numbers."

"The routine tubbing of patients with infected wounds, irrespective of the parts involved, gives remarkable and instantaneous comfort to the patient, and controls suppuration more rapidly than any other method at our disposal, its field of usefulness being limited only by lack of facilities, under ordinary military conditions."

Commander Bainbridge closes this section with the following paragraph:

"In closing this section it may be of interest to point out two contrasts which must strike forcibly anyone who is conversant with the facts. The one contrast lies between the marvelous efficiency of Germany at the outbreak of the war and the conditions, best described as chaotic, which existed at that time among the Allies. The other contrast, more gratifying to us, is shown when we compare those same conditions with the truly wonderful improvement to be found today on the side of the Allies."

Under the head of "Developments of War Surgery" the subjects of anesthesia, joint lesions, fractures, trephined cases, amputations, and plastic and oral surgery are discussed. The section is very well illustrated and contains much valuable information. The reports of various boards and the opinions of eminent surgeons are embodied in the text. The description of the reconstruction work of Delagénière is especially interesting.

The section on trench fever is an epitome of the mode of dissemination and the prophylaxis of that disease. The work of the investigating committee headed by Maj. Gen. Sir David Bruce, the investigations of the problem of louse eradication by Dr. Peacock, and the research work on the bionomics of the louse by Professor Nuttal are referred to and their reports quoted.

The subject of "Care of Wounded from Firing Line to Convalescent Camp" is thoroughly described, discussed, and illustrated under the following sub-headings: Surgery of the forward area, and transportation of the wounded; Special notes on some of the hospitals visited; Military hospitals visited; Convalescent camps. The author's notes on the hospitals and his conversations with the eminent medical officers in the service of the Allies contain much valuable data. He observed, among others, the work of Crile, Carrel, Tuffier, Depage, Pozzi, Chutro, Moynihan, Blake, Cabot, and Cushing.

The functional and vocational reëducation of the wounded is touched upon in a well-illustrated section. Several of the French schools devoted to this purpose are described.

Under the heading, "Conferences of Surgeons," are presented the conclusions adopted by the Inter-Allied Surgical Conferences held in Paris, March and May, 1917, regarding the general principles guiding the treatment of war wounds. It is regretted that lack of space prevents the giving of an abstract of these valuable papers.

The report is concluded with an elaborate and carefully illustrated description of Professor Pedro Chutro's technique of cartilaginous cranioplasties.

FRANCIS M. MUNSON.

Repair Park Operation. Instructions for the use of Officers and Men of the Motor Transport Corps. Central Printing Plant, A. E. F., 1919.

Regulations for Standard Motor Vehicle Operation. A. E. F.

Manual of the Motor Transport Corps. A. E. F.

These three books issued by the American Expeditionary Force cover, in an exhaustive fashion, the service by Motor Transport and are evidence of the important part which it played in the war.

The Motor Transport Corps Manual is of general character, covering all of the common ground of the corps in which the administrative personnel, the maintenance personnel and the operation personnel were alike interested. The Instructions for Repair Park Operations cover primarily the field of the maintenance personnel, while the Regulations for Standard Motor Vehicle Operation cover to a more limited extent the field of the operating personnel. This Motor Transport Corps Manual covers that portion of the work of operating personnel which had to do with camping, billeting, caretaking of vehicles in parks, despatching methods, pooling arrangements, etc.

The many details of the complex duty are clearly dealt with and there is interest in the subject-matter not only for the specialist in this branch but also for the casual reader.

J. R. C.

BOOK REVIEWS

Leishmanioses, Kala Azar. Bouton d'Orient Leishmaniose Americaine, Par. A. Laveran. Paris: Masson et Cie, 1917. Pp. iii+521, 6 plates, 40 figures in text.

It is only sixteen years since Leishman and Donovan made their initial discovery that a protozoan was the etiological agent in the puzzling and till then unsolved disease of kala azar. Since 1903 a literature comparable in extent and volume with that relating to dysentery and almost to that of malaria has grown up, largely in British, French and Italian journals, since kala azar or visceral leishmaniosis and oriental boil or cutaneous leishmaniosis are endemic in British and French colonies and in the circum-Mediterranean area. It is eminently fitting that one of the leaders in these investigations, the veteran protozoölogist of the Pasteur Institute of Paris, Dr. A. Laveran, should critically review the present state of knowledge of these diseases and present his conclusions in his work on "Leishmanioses."

The etiological agent in these diseases is a flagellate, *Leishmania*, similar in morphology to the *Crithidia*, a widely distributed flagellate of the digestive tract of biting insects such as the Hemiptera and Diptera, and one rather closely related to the trypanosomes. In the human tissues or fluids the organisms are aflagellate, rounded or pyriform bodies in multinucleate plasmodial masses. With each nucleus there is associated a single blepharoplast. When such bodies are taken into the digestive tract of the insect or are inoculated into *nnn* culture medium they become therein typical flagellates.

Kala azar or visceral leishmaniosis has been detected in eastern India, Ceylon, northeastern China, Russian Asia, Turkestan, Asia Minor, Egypt, Abyssinia, the Soudan, Tripoli, and Algiers. On the northern coast of the Mediterranean it is endemic in southern Italy and Sicily, Greece, Malta, Spain and Portugal. Canine visceral leishmaniosis occurs also in most of the countries enumerated. There is lack of agreement as to the identity of the parasites producing the two diseases. The weight of the morphological, distributional, clinical, and serological evidence favors their identity, but experiments in cross immunity and more critical observations on the rôle of dogs in the spread of the disease are needed to decide the question.

The propagation of leishmanioses by blood-feeding insects is suggested by the occurrence of *Crithidia* naturally in such insects and their non-hematophage relatives, by the experimental production of flagellate infections in vertebrates by such flagellates of insects, by the presence of *Leishmania* in the peripheral blood, and its experimental transfer by insects from one mammal to another. However, digestive troubles and alterations in the intestinal mucosa also suggest that the digestive tract may be the portal of entry of the flagellate, and, moreover, leishmaniosis never spreads with the rapidity and intensity of some insect-borne diseases such as malaria and trypanosomiasis. The Hemiptera, especially the bedbug and the kissing bug (*Conorhinus*), have been under suspicion, and the former has been experimentally infected by *Leishmania*, but attempts to infect mammals by the bites of the infected bugs generally fail. In the reviewer's opinion, based on the occurrence of spores of *Crithidia* in the rectum of plant-feeding Hemiptera, the most promising field of experimentation lies in infection by viable spores in the feces of the blood-feeding insects, especially of the bedbug. Fleas will sometimes transfer *Leishmania* from dog to dog under experimental control, and Franchini has infected mosquitoes with this

flagellate from spleen punctures, but Patten in Madras got negative results with mosquitoes fed on kala azar patients. Efforts to incriminate the house-fly and ticks have been unsuccessful. Acton's recent summary of the loci of infection suggests the agency of *Phlebotomus*. From all of the available evidence it seems not improbable that the mode of infection is limited to conditions which are infrequently realized, and that this may be by means of certain stages in the fresh feces ingested with the insect or rubbed into the fresh wound made by the insect.

Cutaneous leishmaniosis, Bouton d'Orient, tropical ulcer or oriental sore, was discovered by Dr. J. Homer Wright in Boston in 1903. It is not permanently a disease of this country but is introduced from the Mediterranean area, where it is endemic in nearly all lands bordering that sea. It occurs in Asia Minor, in semi-arid Russian Asia, northwestern India, and Assam. In Tunis and India its area is distinct from that of kala azar. It is found also in dogs and may be inoculated into dogs, cats, monkeys, rats, mice, and guinea-pigs and some other rodents, but not in other domestic animals. In morphology the flagellate of this disease closely resembles that of kala azar, but the clinical manifestations are quite distinct.

A form of this disease known as American cutaneous leishmaniosis presents certain clinical differences, although the flagellate is morphologically similar to *Leishmania tropica* of tropical ulcer of the Mediterranean area. It affects primarily the mucous membranes of the nasal-bucco-pharyngeal region, producing there extensive lesions unlike those of *L. tropica*. This disease occurs in tropical South America, Panama, Martinique and Yucatan.

Travel, commerce and immigration all tend to bring these diseases to our shores, and the extension of American shipping and commerce in the near future will increase the opportunities for their access to this country.

CHARLES A. KOFOID.

HUMAN INTESTINAL PROTOZOA OF THE NEAR EAST. An inquiry into some problems affecting the spread and incidence of intestinal protozoal infections of British troops and natives in the Near East, with special reference to the carrier question, diagnosis and treatment of amebic dysentery, and an account of three new human intestinal protozoa. Conducted under the auspices of the Medical Advisory Committee, M. E. F. (January to August, 1916). By Lieut. Col. C. M. Wenyon, R. A. M. C., and Capt. F. W. O'Connor, R. A. M. C. Published for the Wellcome Bureau of Scientific Research by John Bale, Sons and Danielsson, Ltd., London, England, 1917. 10s. 6d. net.

This work is a reprint of a series of articles published in volume 28 of the Journal of the Royal Army Medical Corps, 1916, with additions and corrections, a paper on "The Carriage of Cysts of *Endameba histolytica* and other intestinal protozoa and eggs of parasitic worms by house-flies, with some notes on the resistance of cysts to disinfectants and other agents," from the same journal, and an appendix with a series of clinical histories of cases.

The book is the direct result of intensive practical field work involving many continuous observations of patients, and a wide range of material, and has in consequence exceptional value as an original contribution. The most striking contribution is the description of a new parasitic endameba of man, *Endameba nana*, which appears to be one of the commonest intestinal amebas and to have been one of

the confusing factors in this much confused field of investigation. It is reputed to be non-pathogenic and has been found by the reviewer to be very abundant both as to infections and as to individuals in both home service and overseas troops of the U. S. Army.

Among the many valuable interesting conclusions reached are the following. A single fecal examination reveals about one-third of the infections brought to light by repeated examinations. In healthy British troops the percentage of infections by *E. dysenteriae* was 5.3. Attacks of diarrhea tend to rid the intestine of amebae temporarily, and thus apparently reduce percentages. Native prisoners showed 13.5 per cent infection with *E. dysenteriae*. Natives serve as reservoirs of infections. Rats, mice, and cats serve as reservoirs of infections with *Trichomonas* and *Giardia*. The majority of carriers of *E. dysenteriae* appear to be perfectly healthy.

The authors give instructive details of the difficulties attending the microscopical diagnosis of the ameba of dysentery from other amebae and body cells, and conclude that the only safe clues are active amebae with included red blood corpuscles, or typical four-nucleate cysts of *E. dysenteriae*. The former occur in acute dysenteric phase, but the latter in the indolent ulcerative or carrier phase of amebiasis. Carriers may remain apparently healthy for years and even never have any history of acute dysentery, though it appears probable that such carriers may have some ulceration of the large intestine. Acute dysentery may initiate the infection or may appear at any period with large amebae with ingested red blood cells, and be followed by prolonged or intermittent periods of the carrier phase when only small free amebae, if any, are found in the stool, and cysts also appear in the stools. In a few long-standing cases very small cysts were found.

The authors are conservative with regard to the pathogenicity of intestinal flagellates. They regard *Giardia* (*Lamblia*) as having the best claim to pathogenicity. It occurs in greatest abundance in certain types of diarrhea with stools of characteristic yellowish mucus. Many healthy carriers of this flagellate were found as also of *Chilomastix mesnili*, a flagellate which Chalmers and Pekkola find abundantly in the Soudan in certain diarrheas. Two new flagellates, *Tricercomonas intestinalis* and *Waski intestinalis*, are described. The latter appears to belong in the genus *Embadomonas*.

The authors clearly incriminate the house-fly as a carrier of human protozoan and worm infections. Flies feeding upon infected feces carry cysts of protozoans and ova of intestinal worms unaltered by their digestive juices and void them in their excrement, it may be, in five minutes after feeding. Some flagellates may survive this rapid transit. The non-feeding fly may carry these infections for as long as forty-eight hours. A large percentage of wild flies having access to feces have been found on examination to be carrying infected material. A fly will eat one milligram of feces in a half-hour. Cysts of *Endameba dysenteriae* survive in water for at least a month, provided the feces are diluted, but drying kills them promptly. Cresol in 1 to 10 solution kills them promptly when mixed with an equal volume of feces, but free chlorine in 1 to 10,000 is without effect. Chlorinated lime used in water sterilization is without effect upon the cysts.

This work is indispensable to every clinical microscopist working with these infections and contains some data on the use of emetin. Best results were obtained with combined subcutaneous injections and oral administration of drug. The later development of the now much used double iodide of bismuth and emetin is unfortunately not contained in the book.

CHARLES A. KOFOID.

Mess Officers' Manual by Several Officers of the Division of Food and Nutrition of the Medical Department, U. S. Army. Illustrated. Philadelphia: Lea and Febiger. Price, $1.50.

This little book of 190 pages may easily be carried in the pocket, but, owing to the good judgment shown by the authors in their selection of material and to their conciseness of expression, the amount of information and practical advice contained in it is out of proportion to its small size. An idea of its contents may be gained from the chapter headings which are: Composition of Foods; Selection and Inspection of Foods; Storage of Foods; Digestion and Absorption of Foods; Nutritive Value of Foods and Their Use in the Diet; Kitchen Economy and Mess Management; The Duties of Mess Officers, Glossary.

Three of the chapters deal with the scientific aspects of nutrition and give in a concise, but at the same time a clear and an interesting form,an account of such portions of this subject as are necessary for an intelligent appreciation of the problems involved in the planning of a satisfactory diet. These chapters are the ones of most general interest, and could be read with profit by anyone who desires in a non-technical form a brief outline of the essentials of human nutrition. Three of the remaining chapters deal with practical matters of more or less general application, and, while the needs of the Army are here kept in the foreground and receive adequate attention, there is much advice on subjects such as the selection of food, the detection of food spoilage, the care of the refrigerator, the use of left-overs, etc., which would be equally useful in any household or civilian institution. In only one chapter—that dealing with the duties of mess officers—is the point of view purely military, and, since this chapter is but eight pages in length, it is apparent that the use of the book need by no means be restricted to army officers.

In addition to the text, there may be mentioned as other features of value a set of working drawings for the construction of a bread box; a vegetable bin, and a sterilizer for dishes, all superior to those in common use in the Army at present, and a useful table of food values, based on the well-known tables of Atwater and Bryant, but arranged so as to lighten the work of making computations and generally adapted, by the incorporation of a number of new analyses and otherwise, to the needs of army messes.

M. H. Jacobs.

Roentgen Interpretation, a Manual for Students and Practitioners, by George W. Holmes, M.D., Roentgenologist to the Massachusetts General Hospital and Instructor in Roentgenology, Harvard Medical School; and Howard E. Ruggles, M.D., Roentgenologist to the University of California Hospital and Clinical Professor of Roentgenology, University of California Medical School. Illustrated with 181 engravings. Philadelphia and New York: Lea & Febiger, 1919.

An excellent volume, the work of two well-known men, each of whom has had extensive experience in Roentgen diagnosis.

The introduction is especially valuable, emphasizing in a very lucid manner the various pitfalls and errors surrounding the subject. Regarding the practice of attempting to render opinions based upon a single plate of any portion of the body, the authors remark: "One view is an isolated observation and is perhaps less to be relied upon than a single observation in any field of medicine."

Warning is also given against the practice of expressing opinions based upon poor plates.

Sufficient space is given to a consideration of anatomical variations, confusing shadows, and artefacts.

The volume is profusely illustrated. The majority of the cuts are excellent.

Appended to each chapter is a carefully selected and extensive bibliography, covering the subjects discussed in the preceding pages. This feature is of very great value.

In the reviewer's opinion, the value of this work entitles it to a more pretentious setting.

GEORGE C. JOHNSTON.

PULMONARY TUBERCULOSIS, by Maurice Fishberg, M.D. Second edition. Illustrated. Philadelphia and New York: Lea & Febiger, 1919. Price, $6.50.

In the preface the author refers to the manner in which the tuberculosis problem has been handled in the armies of the late war, and points out that, although clinically apparent, tuberculosis has for the most part alone been considered a cause for the rejection of the individuals concerned and tuberculin has not been applied for diagnostic purposes at all; the fear felt by many that tuberculosis would prove a serious menace has not been realized, the number of cases of active tuberculosis not having been excessive considering the fact that the large majority of soldiers are in the most susceptible age period. This, he says, is an experiment on a large scale, which shows among other things that tuberculosis is not transmitted by one adult to another, and which fully confirms the "rather unconventional" views on the diagnosis and prophylaxis of the disease which were expressed in the first edition. That a second edition should be so soon required is the best evidence that the work has met with the favor which it deserves. The present edition is much enlarged and nearly every chapter has been revised. The author has a very wide acquaintance with the enormous mass of literature which relates to tuberculosis, and his work is not only a storehouse of facts but of great value as a book of reference to the bibliography of the subject.

The views which Dr. Fishberg modestly calls "unconventional" are those of the school of Romer, Much and Calmette. Their views as to the relation of acquired immunity to the course of tuberculous infection are not as yet the views most widely held in this country but are gaining ground rapidly. The chapter on Phthisiogenesis (Chapter V) gives an excellent presentation of these doctrines, which, though they may not solve all the perplexities of the difficult subject, furnish in general the most satisfactory and practically useful conception of the disease. It is a pleasure to find a systematic writer on tuberculosis who has the courage of his convictions. One is rarely in doubt as to the position of the author with regard to the very numerous subjects which he discusses. The work is to be highly commended to all those who wish to acquaint themselves with the present status of phthisiology.

G. E. BUSHNELL.

RULES FOR RECOVERY FROM TUBERCULOSIS, by Lawrason Brown, M.D. Third edition. Philadelphia and New York: Lea & Febiger, 1919. Price, $1.50.

The author is well known as one of the most prominent tuberculosis specialists of the day. The work, which is intended for the use of the layman, has received a wide circulation in its previous editions, and the appearance of the third edition is the best evidence that it meets a want and has proved useful. As would be expected from their source, the suggestions are practical and judicious and cover the subject with sufficient detail to furnish a guide to those patients who have not the benefit of

the advice of a competent physician. Emphasis is laid upon the importance of avoiding indiscriminate stuffing, and the aim in gaining weight is stated to be to regain the usual weight of the patient and perhaps to exceed it somewhat. The usual weight, or what is often called the normal weight of the patient, is not the same as the average weight for his height and age. This point is commonly overlooked by the patient, who is usually despondent if he does not easily reach this average, and too often forces the feeding. This not only may lead to injury of the digestive organs but, if the individual is of the tall, thin type and succeeds in attaining his object, results in the accumulation of unnecessary and undesirable fat. One who weighs the author's words will be rightly guided, but the "Weight Tables" which are furnished mislead so many that the reviewer doubts the expediency of including them in a work of this kind. It is to be hoped that many will in time take to heart the teachings of this little work, for, to reproduce a quotation cited by Dr. Brown, "In pulmonary tuberculosis the notes of personal experience mature too late and cannot be discounted."

G. E. Bushnell.

The Surgical Clinics of Chicago. Volume III, Number 2, April, 1919. Philadelphia and London: W. B. Saunders Company.

The April number of these Clinics maintains the excellent standard developed in this publication.

Several papers are worthy of special notice: among them are two by Wyllys Andrews, one, "Cholecystectomy and the Management of the Proximal Stump of the Cystic Duct," and another, "Multiple Drilling of Fractures—An Old-fashioned Operation Revised."

Ochsner, as usual, has papers of practical value, and Bevan one on Appendicitis in which he gives an exceedingly comprehensive review of the subject. This paper, if carefully studied by those whose life experience has not kept them in touch with the subject during its evolution, will not only increase their knowledge but also make them safer surgeons. Doctor Bevan has no superior as a teacher of surgery in this country.

There are other papers in this number which contribute to the keeping-up of the excellent reputation of the Chicago Surgical Clinics.

Jno. E. Summers.

The After Treatment of Wounds and Injuries, by R. C. Elmslie, M.S., F.R.C.S., Brevet Major R. A. M. C. (T. F.), Special Military Surgical Hospital, Shepherd's Bush; Surgeon-in-charge of the Orthopedic, Physical Exercise and Massage Departments, St. Bartholomew's Hospital; Surgeon to Out-patients, Metropolitan Hospital; Orthopedic Surgeon to Queen Mary's Hospital, Roehampton; Consulting Orthopedic Surgeon to the Foundling Hospital and National Children's Home and Orphanage. Philadelphia: P. Blakiston's Son & Co., 1919. Price, $4.00 net.

This excellent book, written by an orthopedic surgeon, discusses principally subjects which before the war were regarded as belonging to the domain of general surgery. For instance, there are chapters upon the Treatment of Chronic Osteomyelitis, Mal-Union of Fractures, Delayed Union and Non-Union of Fractures, Injuries of the Nerves, Injuries of the Muscles, Tendons, and Skin, Amputations, and others.

Some specialties are expanding, as in the instance of orthopedics; while others

are more noticeably splitting up, to the detriment, too often, of the public. *Apropos* of this, Sir William Osler, in a recent address, says: "The extraordinary development of modern science may be her undoing. Specialism, now a necessity, has fragmented the specialities themselves. The worker loses all sense of proportion in a maze of minutiae. Applying themselves early to research, young men get into backwaters, far from the main stream. They quickly become hypercritical, and the smaller the field the greater the tendency to megalocephaly. From over-specialization, scientific men are in a more parlous state than are the Humanists from neglect of classical tradition. The salvation of science lies in a recognition of a new philosophy—the scientia scientiarum which Plato describes: 'Now, when all these studies reach the point of intercommunion and connection with one another, and come to be considered in their mutual affinities, then I think, and not till then, will the pursuit of them have value.'"

Within the limits of the subjects treated, this book will compare most favorably with other publications.

The progressive general surgeon would find Dr. Elmslie's book more helpful if he had devoted himself to a more elaborated exposition of the chapter on Physiotherapy. Only fourteen pages are given to this most important part to be played in the after-treatment of wounds, viz., Hydrotherapy, Treatment by Massage, Treatment by Passive Movements, Treatment by Active Movements and Exercises, Electrical Treatment, Functional Reëducation by Work—under all of these headings will be found brief but common-sense advice. There should be more of it.

Jno. E. Summers.

BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

1918 Collected Papers of the Mayo Clinic, Rochester, Minn. Octavo of 1,196 pages, 442 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Cloth, $8.50 net.

The Surgical Clinics of Chicago. Volume 3, No. 3. Philadelphia and London: W. B. Saunders Company, 1919.

On Gunshot Injuries to the Blood-vessels, founded on experience gained in France during the Great War 1914–1918. By George Henry Makins, G. C. M. G. C.B., Honorary Major-General and late Senior Consulting Surgeon to the British Expeditionary Force in France. New York: William Wood & Company, 1919. Price, $5.50.

General Surgery. Volume II. By Albert J. Ochsner, M.D , F.R.M.S., LL.D., F.A.C.S. Chicago: The Year Book Publishers, 1919. $2.50 per volume; series of eight volumes, $10.00.

Plastic Surgery, Its Principles and Practice, by John Staige Davis, Ph.B , M.D., F.A.C.S. Philadelphia: P. Blakiston's Son & Co., 1919. Price, $10.00 net.

INSTRUMENTS AND APPLIANCES

THE PRACTICAL APPLICATION OF AUSCULTATORY PERCUSSION BY CONTINUOUS VIBRATION

By A. A. Surgeon JOHN P. HICKEY
United States Public Health Service

(With five illustrations)

The following letter was forwarded to this office from the Surgeon General, U. S. Army, together with the descriptive booklet published by Dr. Hickey. The entire text of this booklet is more than can be properly published in the pages of this magazine, but we have extracted that which follows as sufficient to indicate the use and scope of the vibrator referred to in Colonel Fauntleroy's letter.—The Editor.

1. Some time in December, I forwarded through the Surgeon General a booklet illustrating the application of an electrical vibrator devised by Dr. John P. Hickey, for the purpose of auscultatory percussion. At the same time I called attention to the special usefulness of this vibrator in facilitating the quick and accurate detection of pathological increase in density in lung tissue, the position and size of the heart, spleen, liver, kidneys and other abdominal viscera; and also, the detection of obscure fractures.

2. As there has been no mention made of this valuable little instrument in The Military Surgeon, I venture to recall my communication to you, with a view to inviting the attention of the profession to this very useful means of diagnosis.

3. Now that recruiting for the Army has begun again, attention is especially invited to this vibrator for the detection of disqualifying defects in applicants. By this instrument the increase in density in the lung tissue can be detected long before it is possible to detect it by the digital method. The accurate outline of the heart, spleen, liver, kidneys and other abdominal viscera is far more easy, and thus the detection of abnormal positions and changes in these organs can be quickly and positively made, and the essential information obtained in determining for the acceptance or rejection of the applicants. The interpretation of X-ray plates is made more easy by this vibrator, especially where there is doubt as to the existence of the shadow, the vibrator corroborating it in the presence of tissue density.

4. Such diseases as paragonimiasis have been detected by this vibrator, together with examination of the sputum and finding in it the ova of the parasites. The results of a previous infection, after the parasites had become extinct, has also been detected by this vibrator.

5. The usefulness of the instrument will be readily suggested upon reflection, and hence no further mention need be made at this time. There seems to be no doubt that the ordinary physical examination failed to show tuberculosis in about 20 per cent of all men examined, and when so detected, it was always readily shown by the X-ray plates. By means of this vibrator, tubercular changes can be detected long before they can be made out by digital percussion, and hence by means of

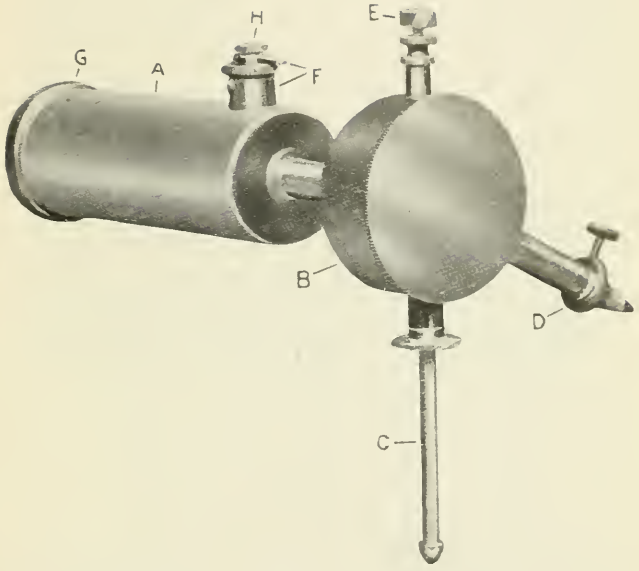


FIG. 1.—The instrument comprises a handle (A) and a head member (B) with an electric vibrator within the head connected with a source of current supply contained within the hand piece. Through the staff (C) the vibrations are adapted to be transmitted to the surface of the body. The outlines of the organs are marked on the surface with the pencil attachment (D). A screw (E) is provided to adjust the vibrator. The switch and locking device (F) permits of opening and closing the current through the vibrator. The battery is removed from the hand piece by unscrewing the end piece (G).

(To face page 488.)

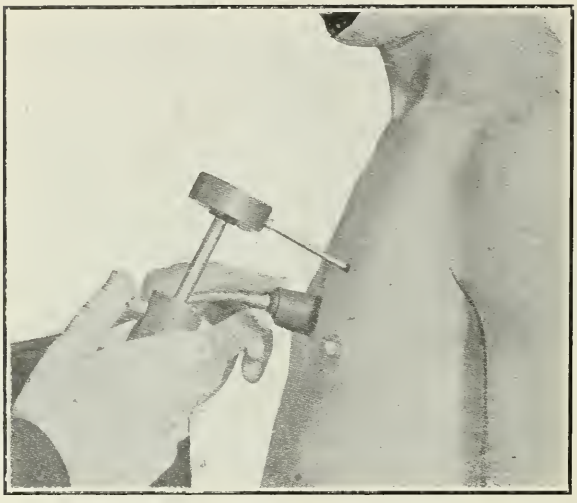


Fig. 2.

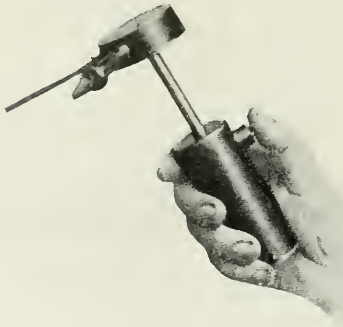


Fig. 3.—Showing the Manner of Holding the Vibrator.

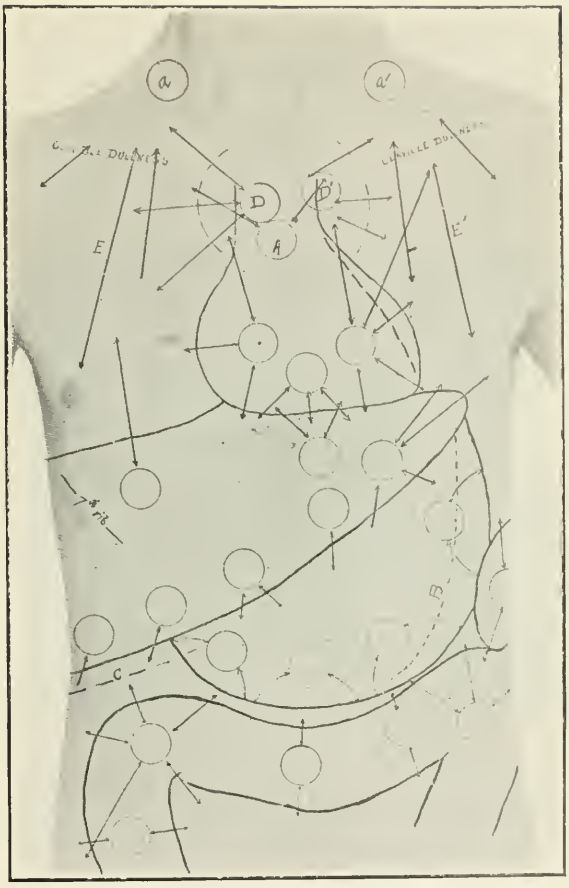


Fig. 4.—The General Scheme for Using the Vibrator (Diagrammatic).

The vibrator is to be moved in the directions indicated by the arrows; the chest piece of the stethoscope being placed over the circles.

a, á. Placement of the stethoscope when examining the lungs.

D, D′. When mapping out mediastinal "dulness."

E, E′. Along these lines, as a rule, changes in pulmonary densities will usually be found. When the vibrator is placed over the clavicle there will be produced a distinct increase in the intensity of the sound, due to the clavicle, while immediately below this point, should there be no infiltration, there will be only a faint sound heard while the staff of the vibrator is moved slowly and lightly applied upon the surface.

B. The usual position of the line found when delimiting the greater curvature of the stomach.

C. The lower limit of liver "dulness" made out during arrested deep inspiration with the body bent backward.

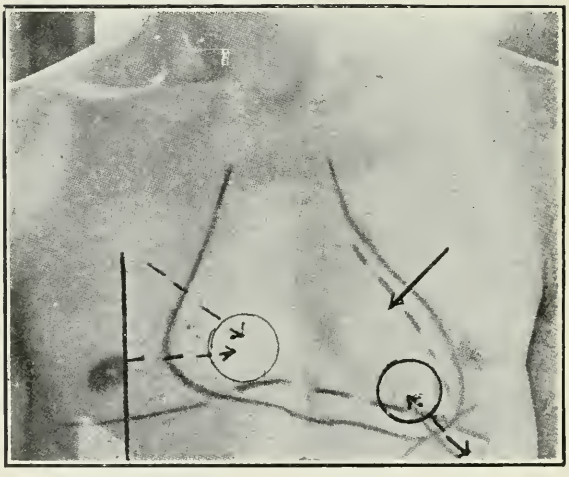


Fig. 5.—Tricuspid Incompetency.

vibratory percussion, the large number of errors made by the ordinary physical examination can be largely eliminated in the examination of applicants for the service. From an extensive personal use of this instrument in the examination of applicants and drafted men, I feel justified in stating that this vibrator will do all that Dr. Hickey claims for it.

P. C. Fauntleroy,
Department Surgeon.

Vibratory auscultatory percussion differs but slightly from the method of auscultatory percussion that was first described in 1840. The claims for the newer method, as will be seen, are not in excess of those advocated at that time, with the possible exception that the vibratory technique will detect impairments of pulmonary resonance, though possible but difficult by the older method. With the exceptions of certain limitations to be mentioned later, the method of auscultatory percussion, using continuous vibration, instead of blows being struck with the fingers or hammer, will be found to possess many advantages over other methods, its relative value to diagnostics being all that a more precise method of percussion may stand for.

Several photographs have been introduced, which will illustrate the technique and at the same time show its applicability to varied conditions.

The method of auscultatory percussion, as described by Camman and Clark (1840), had the following claims made for it:

1. That the heart can be measured in all but its anterior-posterior diameters, under most, perhaps all circumstances of health and disease, with hardly less exactness than we should be able to do if the organ were exposed before us.

2. That the outlines of the liver can be traced with much greater certainty than by ordinary percussion in circumstances of health; and to circumscribe it in many conditions of disease in which ordinary percussion is not applicable.

3. That the dimensions of the spleen can be ascertained in circumstances that baffle ordinary percussion.

4. That by it we can mark the superior, inferior, and external limits of the kidneys. Ascites presents no obstacle to the measurements of these organs; and from enlarged spleen the left kidney is easily distinguished. . . . .

In recent times writers have commented favorably regarding auscultatory percussion, as may be seen from the following quotations taken from standard text books on diagnosis:

. . . auscultatory percussion is a valuable means of defining the exact outline of a dull area, as an aneurism, or tumor within the chest, or determining the limits of organs even of similar nature. . . . Musser.

. . . It is a sufficiently useful method to deserve a much wider use than it has yet attained.

Its particular application is to determine the outlines of either solid or air-containing organs. BUTLER.

This refers to the practicing of auscultatory percussion by digital means, or with a hammer.

The vibrator imparts vibrations that are continuous, following each other in rapid succession, permitting of forcing the underlying structures into vibration. It is to this fact that the possibility of outlining the heart borders with emphysematous lung tissue intervening is attributed, and also the determining of increases in density of lung tissue.

It is not advisable to adhere too closely to set rules in describing the technique as more or less latitude will have to be left to individual users, to vary the technique as physical conditions may require, the most to be expected being a general description of the application of the fundamental principle.

Rather than displacing ordinary percussion, the vibratory method will be of assistance to beginners, by teaching them to recognize the various degrees of impairment of resonance by first pointing it out and also aid those with defective hearing.

With a few changes, the technique for ordinary auscultatory percussion may be applied to the vibratory method, which consists in placing the chest piece of the stethoscope upon the surface overlying the organ to be delimited, holding it in position with the left hand (see Fig. 2), while the vibrator is manipulated with the right hand (see Figs. 2 and 3).

One begins by placing the staff of the vibrator upon the surface, at some distance outside of the presumable limits of the organ, and moving it in the direction of the stethoscope (see Fig. 4). When the border of the organ is attained, there is a noticeable increase in intensity, an elevation in pitch, and perhaps a slight alteration in the quality of the sound. The vibrator is to be moved along lines, that are carried radially from various points encircling the organ, to the stethoscope as a center. If the exact spot on each line at which an alteration in sound occurs is marked, and these marks subsequently joined by a continuous line, an outline of the organ will have been obtained. The double-pointed arrows shown in the accompanying figures indicate that the vibrator is to be moved in two directions: the arrows with the broken shafts, indicate that the vibrator staff is to be applied lightly upon the surface.

The technique will have to be varied somewhat, depending on whether an organ is deep or superficially situated, and, when dealing with the lungs, as to whether the infiltration is of greater or lesser degree.

The varying of the technique will have to do with the amount of

pressure applied through the staff, upon the surface of the body, being analagous to the varying of the force of the blow struck, with the fingers, when practicing ordinary percussion. The lighter the staff of the vibrator is applied upon the surface, the more definite will be the result.

As a rule, sufficient pressure should be exerted to make a faint sound audible through the stethoscope, with the staff placed somewhat outside the area of dullness.

The vibrator may be manipulated in several ways as the physical conditions may suggest:

1. Place the stethoscope over an organ and move the vibrator from various points toward the stethoscope.

2. Place the stethoscope over the organ and move the staff of the vibrator *from* the stethoscope toward the periphery of the structure.

A combination of these two maneuvers will be found most satisfactory.

FLY EXTERMINATION

By Major GEO. L. A. DALE, M. C., U. S. A.

(With five illustrations)

The following letter is published for the information of those interested in fly extermination:

HEADQUARTERS
CAMP DODGE, IOWA

Office Camp Surgeon
July 20, 1919.

Editor Military Surgeon,
Army Medical Museum,
Washington, D. C.

Sir: In planning fly control for the present season, two features, somewhat different from past methods, were decided upon to increase efficiency.

Each organization, as formerly, provide and care for all wire issue traps, sticky fly ribbons and other devices inside of buildings only.

The Camp Sanitary Squad constructed a model of a large improvised fly trap from wire and wood and furnished a pattern to each organization. Each organization was directed to make for itself the required number, but had nothing to do with the after-care.

The camp surgeon directed that these large improvised fly traps be provided in the following numbers for the points designated:

(*a*) At each stable of a regiment or other organization..... 10
(*b*) At each stable or corral in a remount station..... 20
(*c*) At each veterinary hospital..... 25
(*d*) At each cantonment garbage transfer station..... 25

(*e*) At each manure loading station.....25
(*f*) For each garbage can platform at each mess..... 4
(*g*) For each door of each kitchen and mess room of a company or organization..... 2
(*h*) In each lavoratory building or pit latrine shelter..... 2
(*i*) At each door of each bakery..... 2
(*j*) In and about each exchange of a regiment or an organization...12

The Camp Sanitary Squad, provided with truck, fly bait, broom, saw and hammer, takes entire care of these outside traps. Each is visited daily, rebaited and repaired, if found defective, thus insuring constant functioning of all traps.

Once every two weeks each trap is sprayed with a mixture of four parts coal oil and one part denatured alcohol, killing any flies which may be alive. The traps are opened and the flies deposited into a garbage can carried for the purpose. At the end of the trip they are dumped on the ground and lighted with a match. Incineration is quick and complete because of saturation with the inflammable insecticide. Captured flies are removed only every fourteen days, because it was found that considerable numbers acted as an added attraction to the regular bait.

The old fly baits, such as fish or sugar and vinegar, are not employed, because these products are expensive and, when used in amounts as required for daily replacement, the cost to the Government is astonishingly great.

Experiments with different wastes which cost the Government nothing revealed the fact that banana peels and pulp, unsuitable for consumption, canteloupe and watermelon rinds excelled as bait.

When these are insufficient in quantity, they are added to any wet mixed garbage obtainable at the incinerator plant.

The present number of 507 large outside improvised fly traps receive daily care by experienced men responsible to the camp sanitary inspector only. This centralization of control and care has resulted in the capture and destruction of enormous numbers of flies and a satisfactory decrease of those at large. The removal of wastes and employment of larvacides over likely breeding areas play a regular part in the fly control at this camp.

As educational and inspirational effort at coöperation, the following matter was displayed on placards in all halls, depots, barracks, mess halls and kitchens. One thousand of these placards were distributed throughout the Cantonment.

KILL THE FLY

House Fly Is Always Dangerous

The war strain and influenza epidemic have undoubtedly lowered the natural resistance of the people temporarily, and the inhabitants are likely to be more susceptible to summer diseases therefore.

The open winter has favored fly propagation.

One fly killed now means millions less later on.

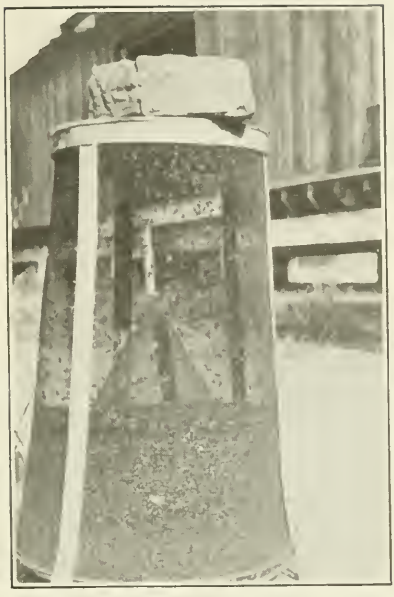
The female fly lays 150 eggs at one time.

She produces six batches in 5 weeks time, her life period.

The possibilities of spreading infection by millions and trillions of flies from such enormous increase is self-evident.

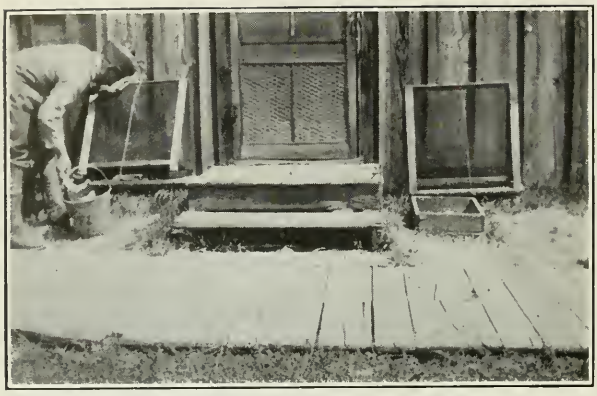
Presence of flies in mess halls, kitchens, exchanges and lunch rooms is evidence of neglect and dirt.

Refuse to patronize a restaurant or soft drink parlor if flies are permitted access to food and drink.

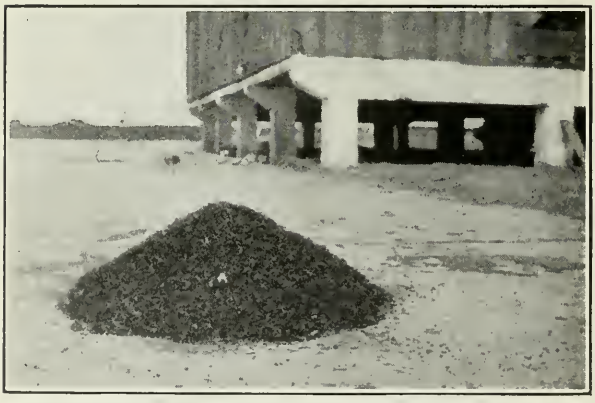


Watermelon Rind for Bait.

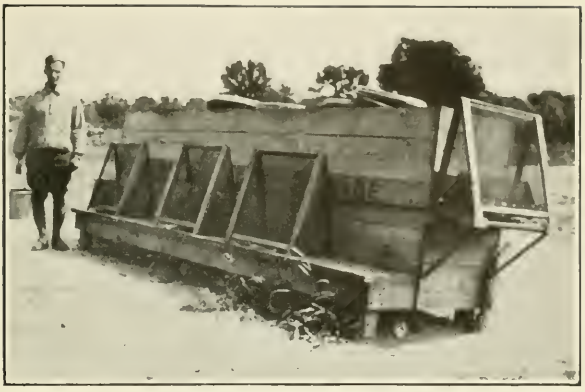
(To face page 492.)



Baiting Traps at Kitchen Door



Estimated 200,000 Flies from Eleven Traps.



Protecting Garbage Stand.

Food Storage Cellar—Remount Station.

Look for them.

They can be observed traveling from filth to food and introducing the germs they have collected.

CLEAN UP AND KEEP CLEAN

Do not leave food exposed to flies anywhere.

Eradicate all filth.

Flies breed in animal excrement, straw, decaying vegetables, fruits and warm earth soiled with organic matter such as drippings from kitchen wastes and sputum.

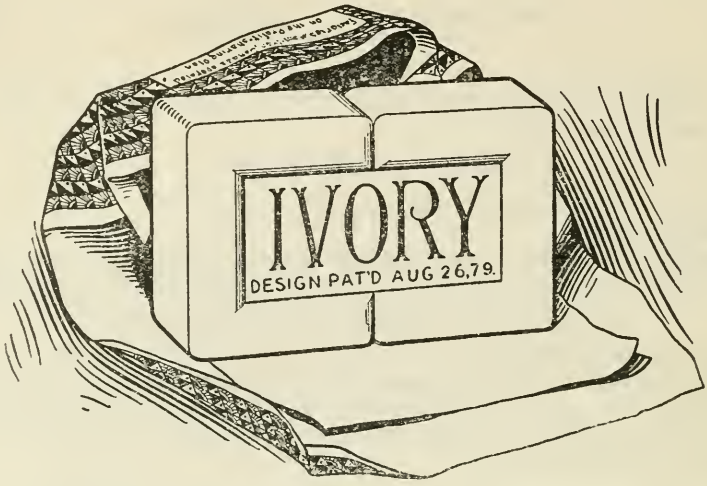
RECIPES FOR STABLES AND SOILED EARTH

Powdered borax sprinkled about the garbage platform, spit boxes, stables and corrals is poisonous to flies and not to animals. After the borax is scattered it should be sprinkled with water. Sulphate of iron, chloride of lime or lye dissolved in water in the proportion of one ounce to the quart, if sprinkled in vaults or in spittoons will prevent flies occupying them.

CAMP SURGEON.

Taking advantage of the predilection shown by flies for alighting upon wires, hundreds of sticky wires were fashioned in two foot lengths hooked at the top and made spiral at the bottom. These were dipped in a mixture of resin and castor oil and hung in all kitchens. When well loaded with flies, the wires were cleaned, redipped and rehung in situ.

GEO. L. A. DALE,
Major, Medical Corps, U. S. A.
Camp Sanitary Inspector.



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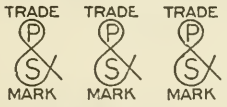

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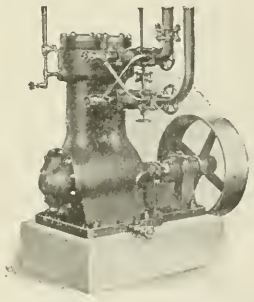

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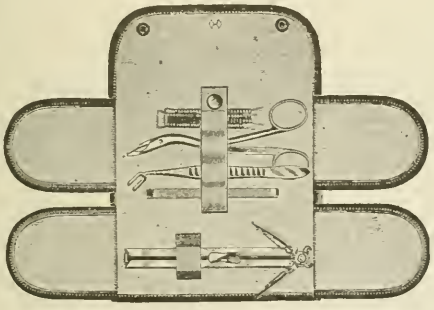

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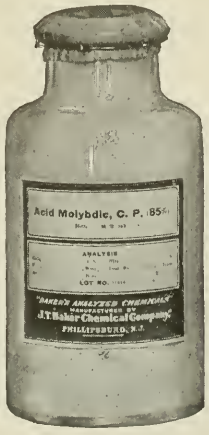

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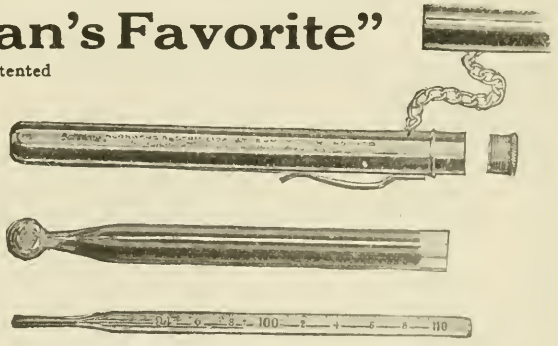

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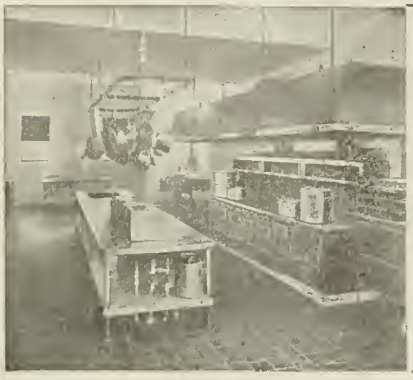

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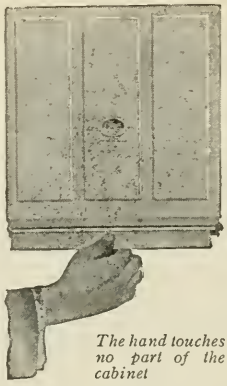

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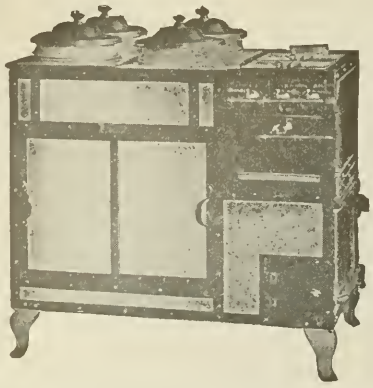

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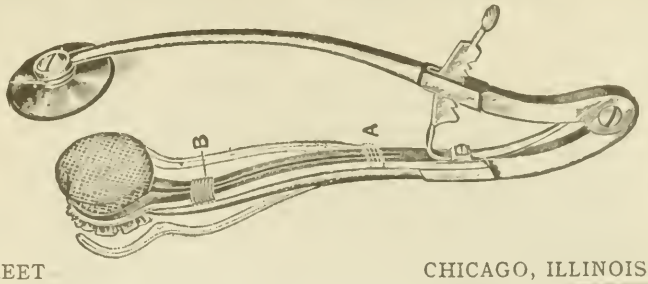

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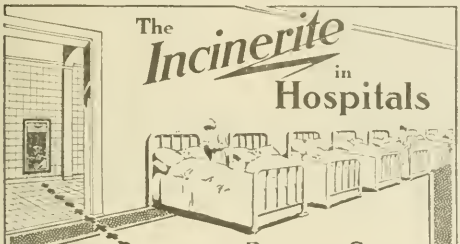

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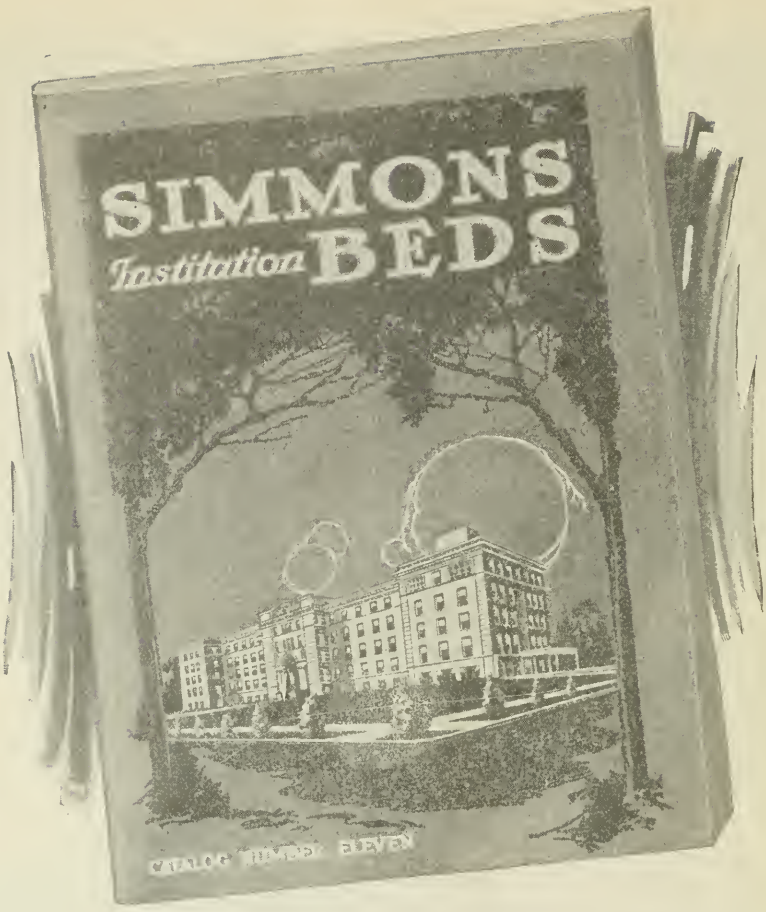

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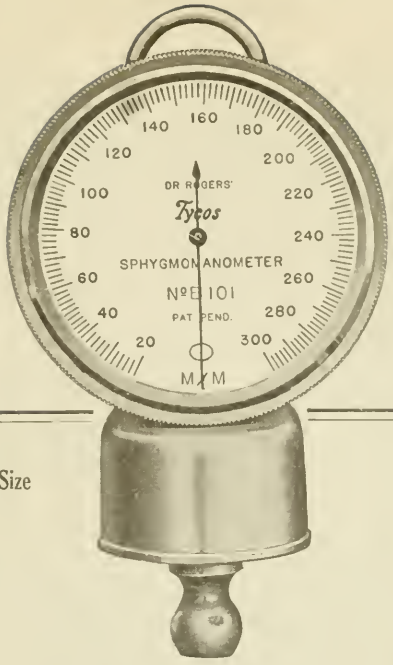

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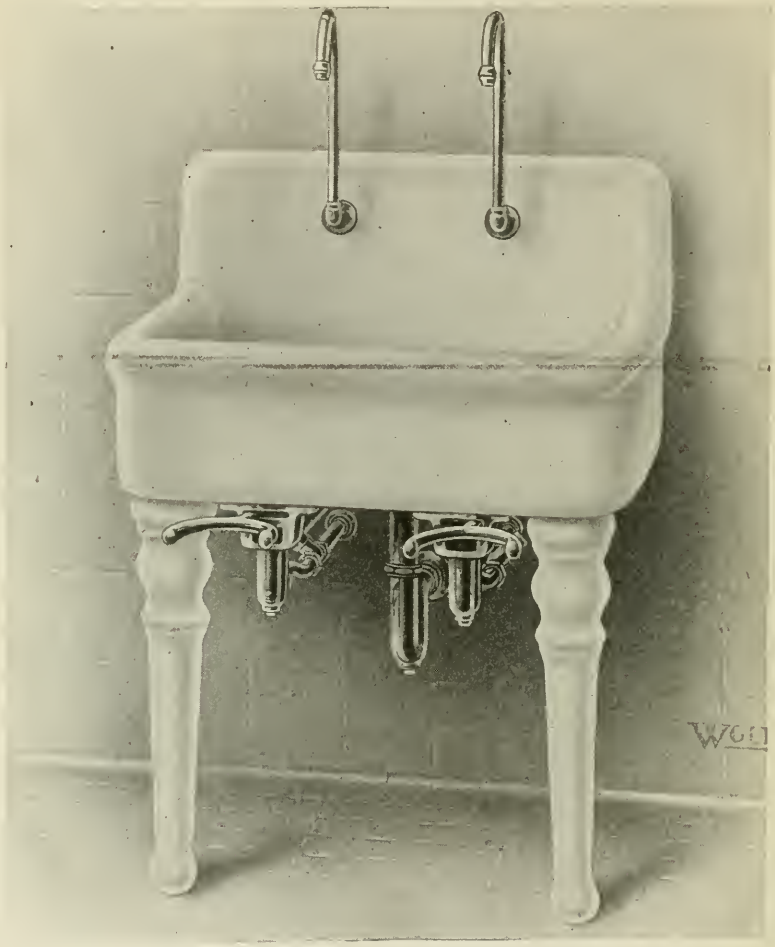

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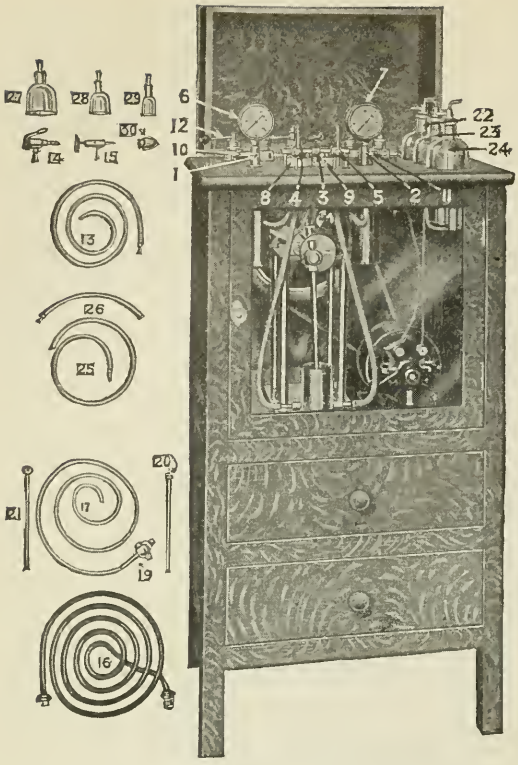

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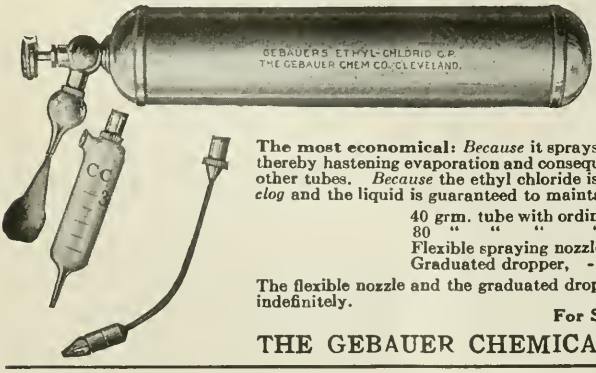

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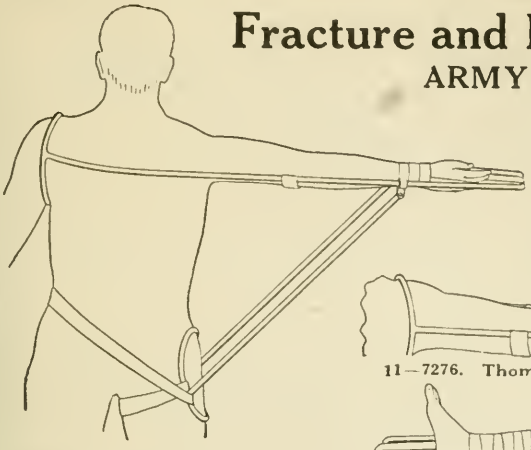

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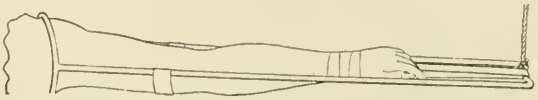

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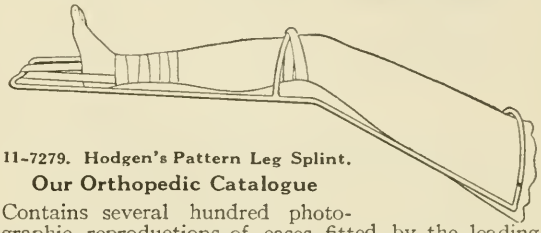

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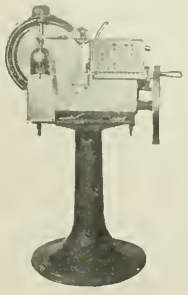

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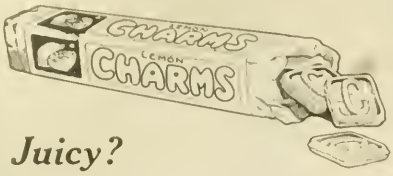

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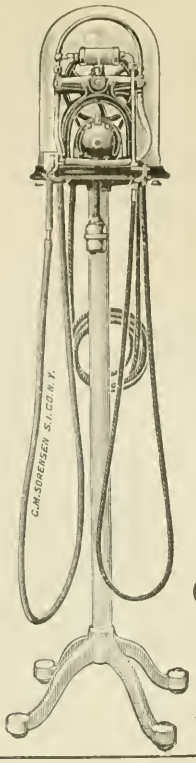

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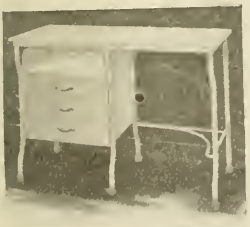

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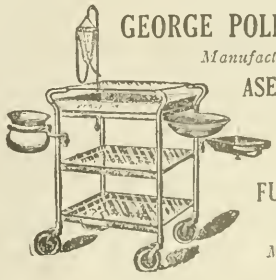

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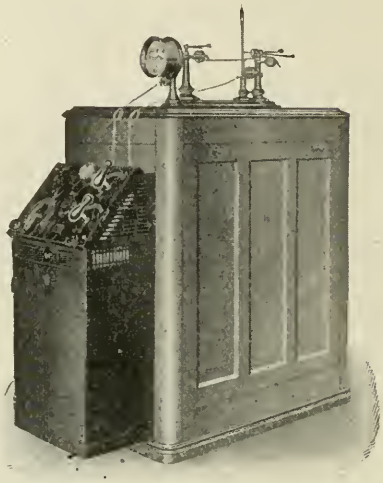

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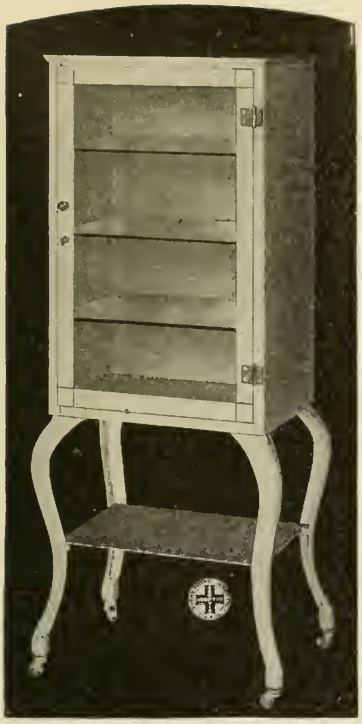

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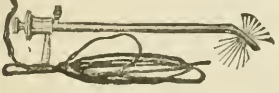

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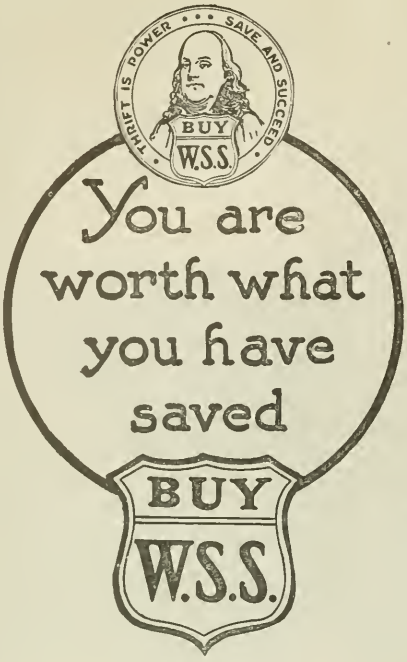

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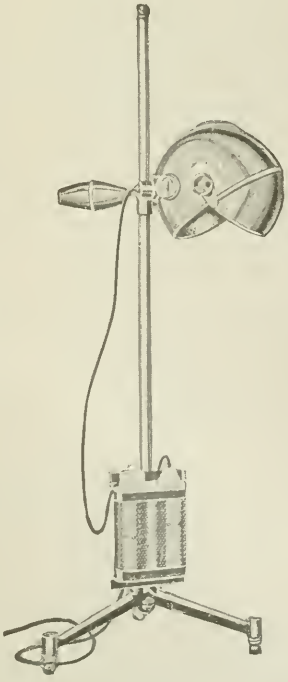

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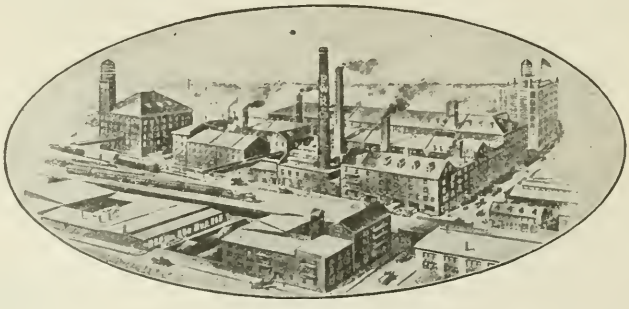

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